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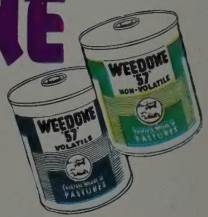

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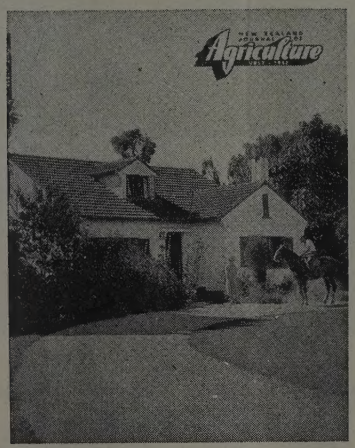

A Bay of Plenty farm home, near Whakatane, is the subject of this month's cover, which has been reproduced from a colour photograph by Atkinson and Finney. The congenial climate of the district is reflected in the vigorous and shapely development of the native and exotic trees and shrubs flanking this home. No other district in New Zealand enjoys a more favourable climate for grassland farming than does the Bay of Plenty and for the same reason it has become one of the main areas for the production of sub-tropical and citrus fruits.

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Survey of Use of Short-rotation Ryegrass

IN 1943 there became available to farmers the New Zealand-bred grass short-rotation ryegrass. Last year, 14 years after its introduction, a survey was made to obtain some facts about the use or non-use of the grass in the Dominion. This material was used as the basis of a paper presented by R. H. Scott, Land Utilisation Officer, Department of Agriculture, Wellington, at the annual conference of the New Zealand Grassland Association in 1957. This article is based on that address.

TO obtain data to show differences between the many farming districts of the Dominion would have involved approaching a considerable number of the 75,000 farmers who hold farms of 20 acres or more. Extension officers did not have the time to conduct a survey on this scale, and also it was desired to complete the survey as quickly as possible.

It was therefore necessary to work out a system whereby the selection of a very small percentage of farms would give sufficient information to show differences on a much broader district basis. The selection of farms had to be one which also would be representative of all farms likely to be using the grass.

Sampling Method

The method adopted was as follows:

1. It was decided to confine the investigation to the more intensive farming districts, that is, where dairying, sheep farming for the production of wool and fat lambs, or farming for the production of cereal or pasture seed crops or some combination of these was the feature. All hill areas where sheep farming for the production of wool, store sheep, and some fat lambs was the system were excluded.

2. For each district serviced by an officer of the Extension Division a base map was selected. The map was a sheet of the 1 mile to 1 in. (scale 1 : 63,360) topographic series issued by the Department of Lands and Survey. Such maps show the location of farm homesteads and farm buildings. Each sheet covers an area of about 280,000 acres and as several sheets were required to cover the district serviced by an extension officer, the sheet selected was the one which indicated the most intensive land-use pattern; that is, the one which had the most intensive roading system and the greatest number of buildings per unit of area.

In a few cases no such maps were available for districts served by extension officers, and these districts were omitted from the survey. Generally these districts were extensively farmed areas, for example, parts of Central Otago.

3. On each map 10 farms were selected at random by persons who had little knowledge of the district. Thus bias in selection was avoided. In all 449 farms on 45 maps were selected. (There should have been 450 farms, but in one case where a farm selected was unsuitable another was not substituted, owing to an oversight.) These maps covered about 3 million acres of intensively farmed land as previously defined.

A few of the properties selected proved unsatisfactory from the point of view of the survey. Some were racing stables, some market gardens, and some poultry units. Where this occurred a further farm was selected at random as a substitute for the unsatisfactory unit.

4. To obtain satisfactory statistical results from a sample of only 10 farms in each extension officer's district was not possible, so the next step was to combine some of the districts. This was done mainly by combining districts having a somewhat similar climate.

The combined districts and the subsidiary districts forming these are set out below. The map on page 4 shows the approximate location of the districts which were combined.

North Auckland: Kaitaia, Kaikohe, Whangarei, Ruawai, Maungaturoto, Helensville

Waikato: Pukekohe, Hamilton-Cambridge, Te Awamutu-Otorohanga, Ngakuru Valley (Rotorua), Matamata

Bay of Plenty: Paeroa-Netherton, Tauranga, Edgecumbe, Lepperton-Waitara (Taranaki)

Poverty Bay-Hawke's Bay: Gisborne Flats, Heretaunga Plain

Hawera: Hawera

Wellington: Stratford, Marton, Palmerston North, Dannevirke, Horowhenua, Wellington

Wairarapa - Nelson - Marlborough: Greytown-Martinborough, Wairau Valley, Waimea Plain (Nelson)

Plains: Sefton-Balcairn, Lincoln-Ellesmere, Ashburton, Geraldine-Orari, Levels Plain

Downs: Timaru, Waimate, Oamaru, Palmerston

Dunedin: Taieri Plain, Milton

Southland: Kelso, Woodlands, Winton, Drummond-Otautau

The survey indicated that the first district to use short-rotation ryegrass to a significant extent was Canterbury, with the Waikato and Bay of Plenty next. Within 4 years of its release its use had become widespread, and from 1947 to 1955 considerable numbers of farmers throughout the intensive farming districts began to use the grass for the first time. However, during 1956 and 1957 the number of farmers using short-rotation ryegrass for the first time declined considerably, mainly owing to saturation point having been reached in some districts; that is, most farmers in these districts were using the grass. This was evident particularly in the Dunedin and Southland districts.

As could be expected some farmers who began to use short-rotation ryegrass discontinued to use it. Information on this point from the survey could not be taken as conclusive, but it appeared that the greatest percentage of "casualties" was in North Auckland and the Downs region of South Canterbury and North Otago.

Extent of Use in Districts

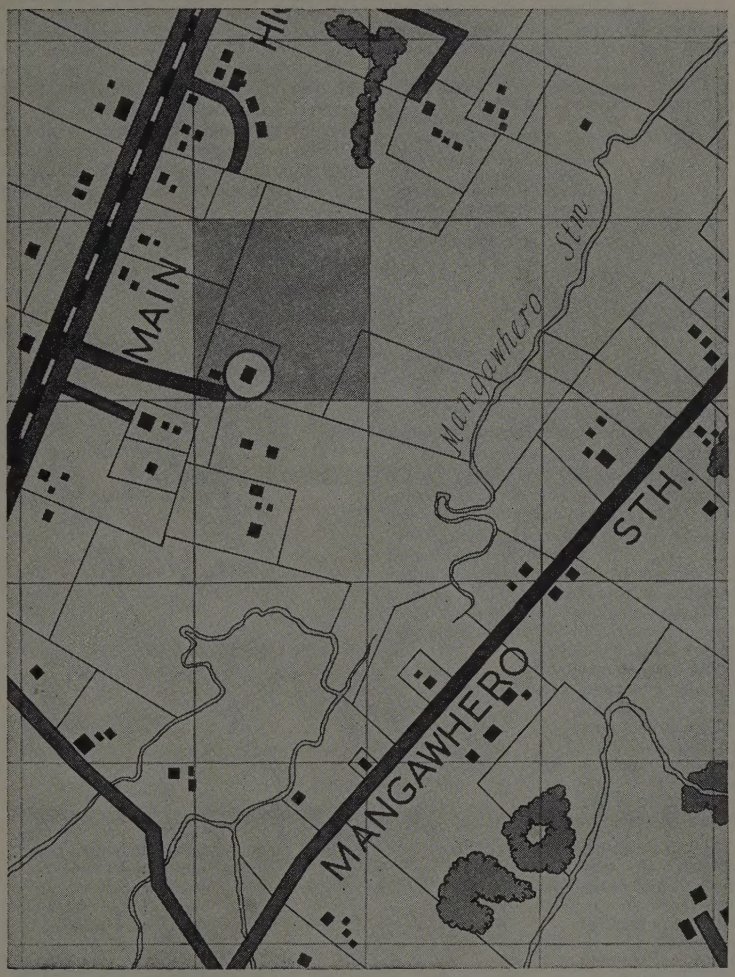
The extent to which the grass is used in the respective intensive farming districts is set out in Table 1, the districts being arranged in descending order of use.

TABLE 1—PERCENTAGE OF FARMERS USING SHORT-ROTATION RYEGRASS

District	Per cent of farmers using short-rotation ryegrass	Confidence limits
Southland	98	86%-100%
Dunedin	95	75%-99%
Wairarapa-Nelson-Marlborough ..	73	54%-88%
Wellington	73	58%-83%
Plains	71	57%-82%
Bay of Plenty ..	68	51%-83%
Waikato	68	53%-81%
Downs	62	45%-77%
North Auckland ..	46	33%-59%
Hawera	35	15%-59%
Poverty Bay-Hawke's Bay	5	1%-26%

The statistician computed a definite figure, which is given in the second column of the table, and the degree of confidence which can be placed in this figure (given in the third column). Thus, though 98 per cent of the farmers in the Southland intensive farming areas are shown as users, the actual percentage of users lies between 86 and 100 per cent.

The general pattern is that the further south one goes the greater is the percentage of farmers who use the grass. However, the pattern is partly spoilt by the fact that the percentage of users on the South Canterbury and North Otago downs is not as great as expected. The low figure for North Auckland is consistent with the criticism that the grass will not persist because of drought and temperature conditions. The very low figure for Poverty Bay-Hawke's Bay is what could be expected with a farming system in which there is considerable production of perennial ryegrass seed. The low figure for Hawera (Waimate Plain) appears out of place, but 45 per cent of the farmers covered in this area of the survey stated they had not resown any pasture during the past 10 years.



An adaptation of part of a sheet of the maps used in the survey. The maps have a grid marked on them which gives squares representing 1,000 yds. x 1,000 yds. On each sheet used for the survey 10 of these squares were selected on a random basis and coloured (shaded square shown). One building in each square was enclosed by a circle. The farm to which this building belonged was visited by the extension officer conducting the survey in that area.

Proportion of Pasture Sowings Including Short-rotation Ryegrass

The results showed that in districts where pasture seed production was not a feature farmers using short-rotation ryegrass in pasture mixtures did not sow down any great area of new pasture without including this grass. In North Auckland, the Waikato, Bay of Plenty, and Wellington regions more than 80 per cent of the area of pasture sowings made by farmers in the survey over the 7 years ending in June 1957 included short-rotation ryegrass. In the Dunedin and Southland regions the percentage was over 70, in the Plains region 64 per cent, in the Downs 51 per cent, and in the Wairarapa-Nelson-Marlborough region the low figure of 23 per cent.

The Plains and Downs regions had appreciable sowings of short-rotation ryegrass alone, these being mainly

sowings where the grass was used as a greenfeed crop or was sown for seed.

TABLE 2—PERCENTAGE OF AREA OF PASTURE SOWINGS OVER 7 YEARS ENDING 30 JUNE 1957 WHICH CONTAINED SHORT-ROTATION RYEGRASS

District	Area with short-rotation ryegrass in mixture per cent	Area with short-rotation ryegrass alone per cent	Total with short-rotation ryegrass per cent
North Auckland	79	1	80
Waikato	82	1	83
Bay of Plenty	98	1	99
Wellington	72	11	83
Wairarapa-Nelson-Marlborough	15	8	23
Plains	26	38	64
Downs	28	23	51
Dunedin	71	11	82
Southland	65	6	71

The data obtained on seed mixtures gave the following information: The mixture pattern on dairy farms in North Auckland and the Bay of Plenty appeared to be similar, generally comprising 15 to 20 lb. of perennial ryegrass, 10 to 15 lb. of short-rotation ryegrass, and 2 lb. of white clover and sometimes a little red clover and other grasses. In the Waikato, Hawera, and Wellington regions the common mixture comprised 20 to 30 lb. of perennial ryegrass, 8 to 15 lb. of short-rotation ryegrass, and 2 to 3 lb. of white clover; except for the Waikato the mixture invariably included 2 to 3 lb. of red clover.

On the sheep farms it was usual to find mixtures of 20 to 30 lb. of perennial ryegrass, 10 to 15 lb. of short-rotation ryegrass with 3 to 4 lb. of white clover and a few pounds of other grasses. However, Southland was an exception; here the mixture invariably comprised no more than 20 lb. of perennial ryegrass, 10 lb. of short-rotation ryegrass, and 3 to 4 lb. of white clover with a small quantity of other grasses.

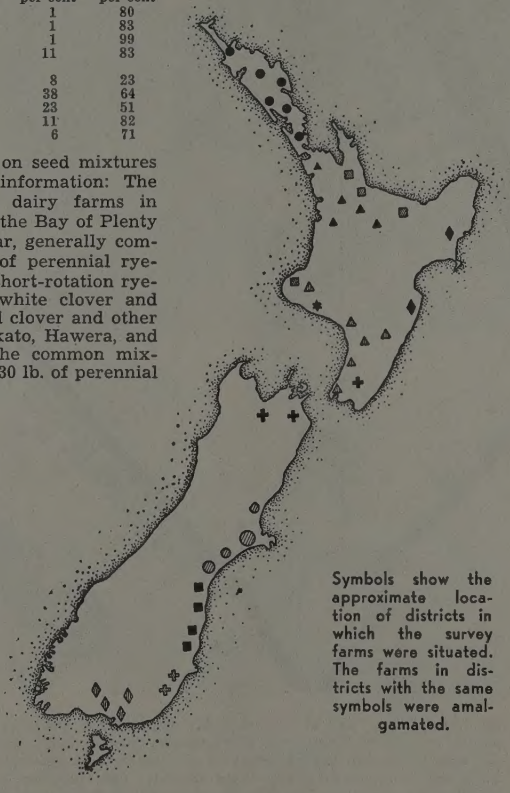
Method of Sowing

Information on the method of sowing showed that, except for North Auckland, most farmers sowed on ploughed or cultivated land. In North Auckland about 40 per cent of the farmers adopted this practice, about one third broadcast on existing pastures, and about one quarter sowed out on surface-worked pasture. In the Waikato and Bay of Plenty some sowings were done by sod seeder, but there was no evidence that this was a significant practice in other districts.

Persistency of Grass

Farmers were asked how long short-rotation ryegrass persisted in their pastures. Opinions were based on the farmers' personal experience with the grass over several years. To obtain an indication of district differences an arbitrary division was made of the life of short-rotation ryegrass in pastures, this division being as follows:

Where short-rotation ryegrass lasted less than 2 years it was classified as "Temporary". Where it lasted over 2 years and up to 4 years the classification was "Short Rotation", and where it lasted over 4 years it was classified as "Permanent".



Symbols show the approximate location of districts in which the survey farms were situated. The farms in districts with the same symbols were amalgamated.

TABLE 3—PERSISTENCY OF SHORT-ROTATION RYEGRASS IN PASTURES

District	Percentage of farms Temporary	Short Rotation	Permanent
North Auckland	42	47	11
Waikato	15	70	15
Bay of Plenty	12	71	17
Wellington	16	68	16
Wairarapa-Nelson-Marlborough	20	73	7
Plains	7	80	13
Downs	12	75	13
Dunedin	7	53	40
Southland	—	59	41

Though the figures in Table 3 cannot be taken as precise, it is considered that they show broadly the district differences.

In North Auckland on about 42 per cent of the farms short-rotation ryegrass lasted less than 2 years and on only 11 per cent of the farms was it considered permanent. In the Dunedin and Southland districts the reverse was the case; here on about 40 per cent of the farms short-rotation ryegrass was classified as permanent.

As a side issue on the question of persistency, it was found that very few of the short-rotation ryegrass users in the survey in the North Island used DDT to control grass-grub, the highest being 9 per cent in the Wellington region. However, in the South Island as many as 50 per cent in the Plains region and slightly over 30 per cent in the Dunedin and Southland regions used DDT.

Attitudes to Short-rotation Ryegrass

An endeavour was made to obtain an indication of the attitude of farmers to short-rotation ryegrass, but the information under this heading was not complete.

Most interesting were the attitudes of the non-users. Of all non-users 15 per cent had sown no new pasture for 10 years, 11 per cent were producers of perennial ryegrass seed and did not want their stands contaminated, 5 per cent considered the grass too short lived, 5 per cent held that it would not stand up to dry conditions, and 6 per cent had never heard of it, these last including those who considered "new-fangled" ideas created troubles.

An analysis of the attitudes of the users did not give a very clear picture. Forty-nine per cent of the users favoured the grass because of its good winter and early spring growth, and those in Canterbury, Otago, and Southland also valued its good late-autumn growth. However, among the users, 16 per cent were not very enthusiastic about the grass, the main criticism being that it would not persist and would not stand dry conditions. This criticism was particularly pronounced in the North Auckland and the Bay of Plenty districts.

The main objective of the survey was to obtain facts about the use of short-rotation ryegrass. A secondary aim was to ascertain whether or not it was possible, with the help of extension officers of the Department, to complete satisfactorily a simple survey of this nature on a Dominion-wide basis. It proved possible to do this—organise the survey, carry out the field work, and analyse material—within 4 months.

Feed Trough-Perching Trestle for Poultry

By M. E. SUTTON,
Poultry Instructor,
Department of Agriculture,
Dunedin

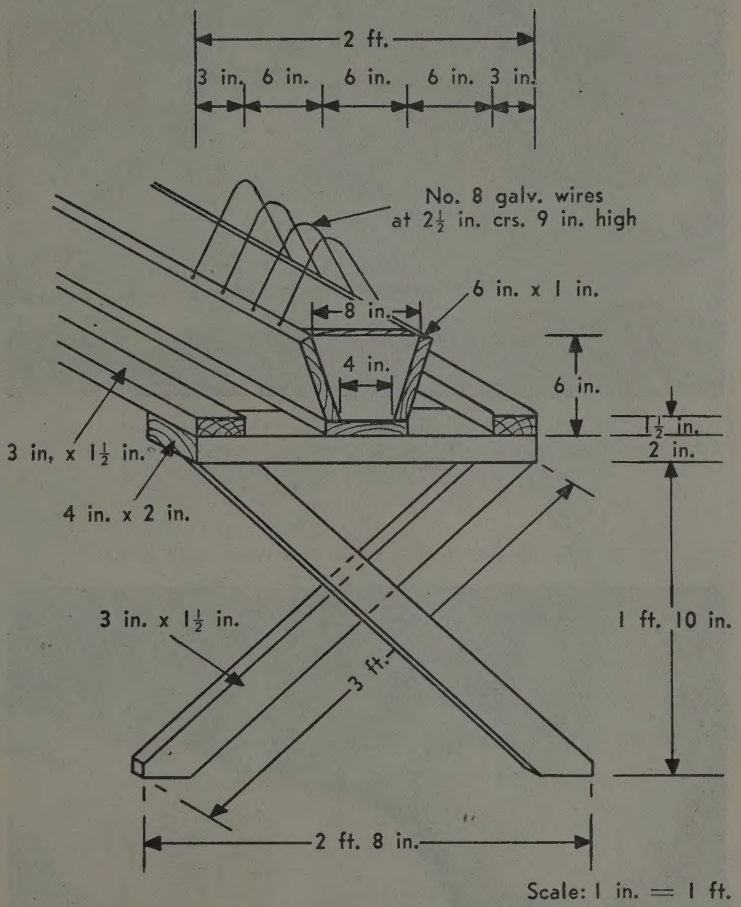
ESSENTIAL equipment for intensive or semi-intensive laying units for poultry includes food troughs or hoppers and perches. The perches, under which most of the droppings accumulate, are usually at the back of the pen, and feed troughs or hoppers are toward the front. This arrangement, in ensuring adequate space for the birds to eat and sleep, takes up a large portion of the pen.

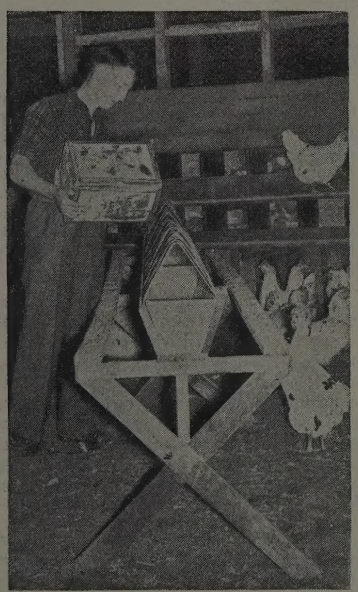
THE functions of eating and sleeping can be provided for with one piece of equipment, a feed trough-perching trestle. There can be little doubt that, when correctly constructed, this combination has advantages, particularly where birds are penned in large numbers.

Construction

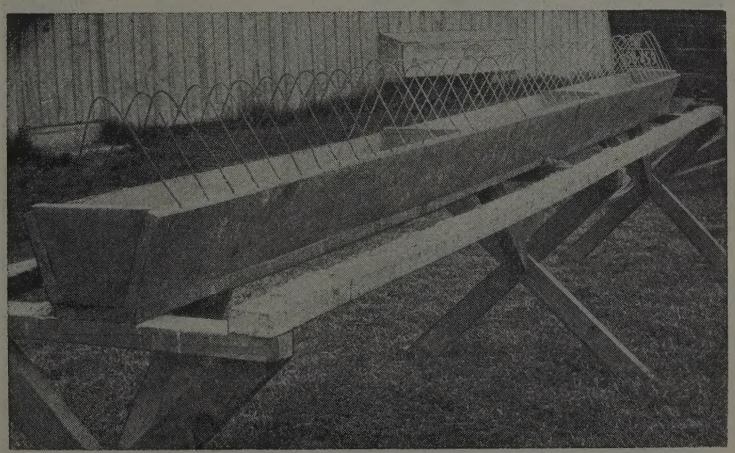
The feed trough-perching trestle consists of a wooden trough supported by a stand. On either side of the stand a perch is attached to enable the birds to reach the mash in the trough. This perch on which the birds roost at night is a sufficient distance from the trough to ensure that all droppings fall to the ground.

To prevent birds from roosting on the trough lengths of V-shaped No. 8



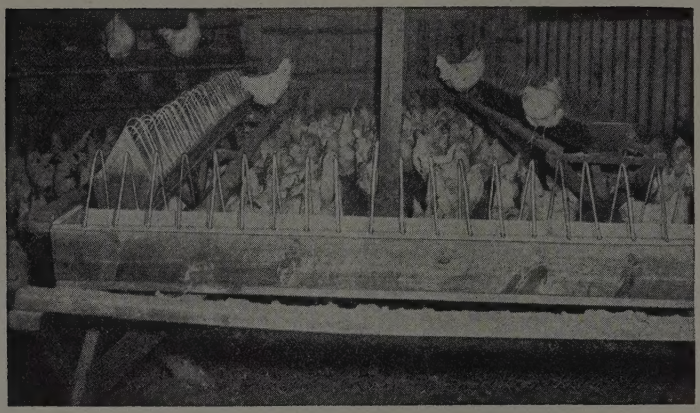


The trough being filled with mash.



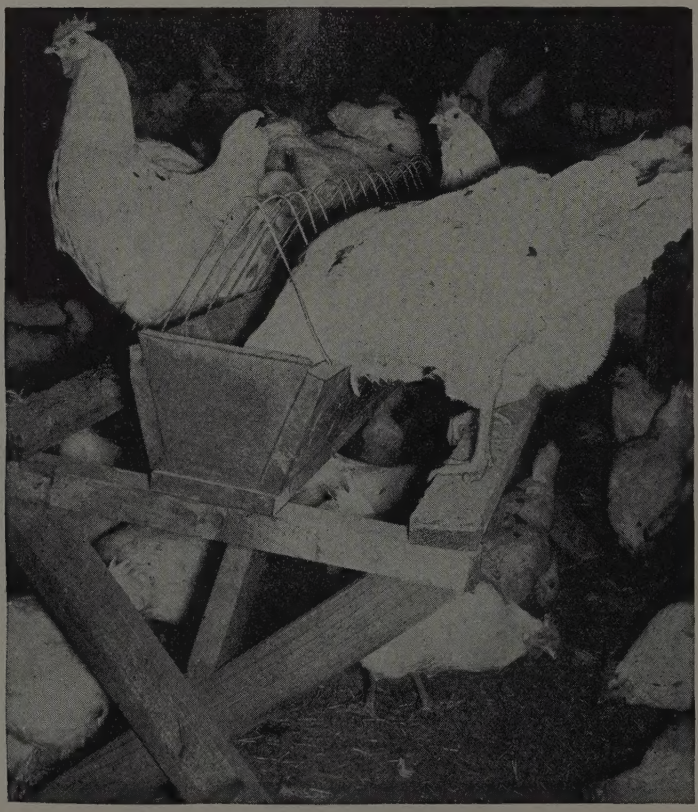
The simplicity of construction and effective method of preventing the birds from getting into the feed trough are shown.

FEED TROUGH-PERCHING TRESTLE



Feed troughs well spaced to make the best use of the floor space. Troughs should be moved from time to time to spread the droppings evenly over the litter on the floor.

The ease with which birds can feed from these troughs is shown.



wire are inverted and fixed into the edge of the trough. These wires are spaced at 2½ in. intervals and it is through these gaps that the birds eat.

By placing one foot on the perch and the other on the trough edge birds can reach food at the bottom of the feeder. A small lip can be fitted on each side of the trough to prevent wastage of food.

The feed trough-perching trestle can be constructed to any length required. As long as there are enough trestles to ensure that the birds roost comfortably there will be ample feeding space. As each trough is double-sided one trestle 12 ft. 6 in. long will give 25 ft. of both feeding and roosting space.

To estimate the perching space required by a flock about 8 in. of perch space should be allowed for light breed birds and 10 in. for heavy breeds and crossbreds.

Spread of Droppings

The use of these trestles ensures that the droppings are more evenly spread over the floor of the laying shed. During cold or wet weather when litter tends to become damp the trestles can be moved about, a large concentration of droppings in one place thus being eliminated.

The trestle feeding troughs also do away with massing together of birds at night, when pockets of poor ventilation often occur, which can lead to outbreaks of colds. When the pen is to be cleaned out or the litter requires attention the trestles can be removed from the shed.

Trough Space

A common fault in many laying sheds is the shortage of trough space. This accentuates picking and bullying. Some birds will not fight for their food and take to the perches, where they remain without food until their courage returns. This leads to their being turned into culls. With the trough-perch combination there is little possibility of a bird being driven away from the food.

The main disadvantage of the feed trough-perching trestle is the danger of its becoming a lurking place for red mites. However, these can be effectively controlled by creosoting the equipment before use and then every year at cleaning-out time. The trough-perch equipment should be inspected regularly, more particularly during warm summer weather, when mites can multiply rapidly.

The feeding trough may be lifted off the trestle for the first night or two to encourage birds to use the perching trestle.

Branding and sampling sealed bags of perennial ryegrass seed.

Seed Production in New Zealand

Grass and Clover Seed Certification

By J. H. CLARIDGE,
Superintendent, Seed Industry, Department of Agriculture, Wellington

WHAT has been the main contribution to pasture improvement in recent years? If this question were addressed to many New Zealand farmers, their answer doubtless would be "seed certification". But is this really the correct answer? Only in so far as a seed certification scheme enables seed to be certified and provides a means of identifying type or strain which cannot be recognised from an examination of the seed itself. In the series of articles on seed production appearing in the "Journal", frequent reference has been made to seed certification. In this article, the last of the series, the scheme as a whole is described and its effect on pasture production discussed.

IN 1929 the Department of Agriculture introduced a scheme of certification covering grass and clover seeds. Before that certain farmers claimed superior results with seed from certain districts—for instance, Hawke's Bay, Poverty Bay, and Sandon ryegrasses were recognised in some quarters as being better in production and performance than ryegrasses from other districts, and Akaroa cocksfoot seed had already gained a reputation both locally and overseas.

The superiority of seeds of certain origin was not generally recognised, however, nor were those who had formed opinions for themselves always able to buy seed of the origin they preferred. The buyer was unable to obtain an assurance that any line of seed was what it was claimed to be.

Disquieting Situation

During the 1920s information was gradually becoming available from the results of investigations into pasture plants. This disclosed a very disquieting situation. Very few good lines of perennial ryegrass existed outside the three districts already mentioned, and even within these areas lines of poor type could be found.

A really satisfactory line of Italian ryegrass could not be located any-

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where—the best lines were only fair; the worst were hybrid types, which were sold either as Italian ryegrass or as perennial ryegrass, depending on the market. They possessed none of the good qualities of either Italian ryegrass or perennial ryegrass, but behaved in a manner far inferior to either species. Much seed was sown as Western Wolths, but a genuine line of this variety could not be found; it was just another name for Italian ryegrass.

There did appear to be a degree of uniformity in lines of cocksfoot seed, but as many tons of seed of Danish origin had been imported from time to time, there were grave doubts that all lines finally would prove to be of the strain originating on Banks Peninsula.

Browntop was found to be uneven in type, owing, on the one hand, to mixture and hybridisation with other species of *Agrostis* and, on the other, to the development of specific regional strains.

The descriptive terms applied to lines of red clover seed appeared to have no real merit. Cowgrass contained the same range of plant types as giant red clover, and in similar proportions, and buyers were misled by the attempts to create distinct types by the use of different names. At this stage Montgomery red clover had not been introduced into New Zealand and all lines of locally grown red clover were very similar in composition.

The position regarding white clover was also obscure. Some areas were located in which a truly permanent, leafy, and high-producing strain was flourishing, but in many areas, particularly in arable districts, white clover had deteriorated virtually to an annual. This type of plant had low production and its claim to permanence was based on its ability to re-establish each season by seeding.

Isolation of Superior Strains

The picture of pasture plants in New Zealand before the introduction of seed certification was certainly far from rosy, though there were bright spots. Some good lines of perennial ryegrass and white clover could be found, and nowhere in seed-producing areas did it appear that Danish cocksfoot had become established. Though local strains of Italian ryegrass were so mediocre, New Zealand was fortunate in receiving from Europe two or three parcels of Italian ryegrass seed of very good type. There were large areas of browntop of pure and uniform type which were capable of producing seed ideal for incorporation in lawn grass mixtures and, at least, there was no great variation in red clover types.

Seed being loaded for transport to the seed-dressing plant.

It is true that even in the best lines of pasture species a considerable range of type could be seen in individual plants. Though under plot conditions these differences passed quite unnoticed, they were all too apparent when species were grown out as individuals. This variation proved to be a blessing, as it enabled superior plant strains of all New Zealand's main pasture species to be isolated. This work led to the development of pedigree strains, which today play such an important part in New Zealand grassland farming.

In other countries work on pasture species has been undertaken and the discoveries made have been similar to those in New Zealand, but in no other country have these discoveries been extended so far into standard farming practices as they have in New Zealand. The reason for this is undoubtedly that in New Zealand a means — seed certification — was developed which enabled the findings and results of research into pasture plants to be carried right through to the practical farmer on his own land. That is the real purpose of the scheme of seed certification, which was first introduced to meet the demand for better seed potatoes and seed wheat but was rapidly modified to meet, first, the necessity for identifying seed of superior natural strains of pasture plants and, later, the seed of pedigree strains as these were evolved.

What is really meant by the value of seed certification is the value of the strains of seeds which are recognised under the certification scheme.

Operation of Scheme

Though the scheme of seed certification in New Zealand is operated by the Department of Agriculture as an impartial body to give the seed buyer an assurance of the strain of seed he is buying, its success has resulted from the close co-operation of the farmer growing the seed, the merchant who does the cleaning and marketing of it, and the officer of the Department of Agriculture responsible for the certification of it. Seed certification is not operated under any Act or Regulation; it is controlled by the Department of Agriculture, but depends for its success on the good will of all co-operating parties. Experience over the years the scheme has been operating proves that the present method of administering it is entirely satisfactory.

The aim of any certification scheme is to give the buyer of seed an assurance regarding some point of quality which cannot be determined readily by an examination of the seed itself, and it is widely recognised that strain in pasture plants cannot be so determined. This places the buyer at a disadvantage, as hardly ever is he in a position to observe, even less to evaluate, the plants from which the seed is saved. The certification scheme provides, in the interests of the buyer, for the strain of plant to be determined satisfactorily and for the resultant seed to be identified under seal until the time comes for it to be sown for pasture establishment.

Stages in Certification

The scheme varies with the particular species under consideration.

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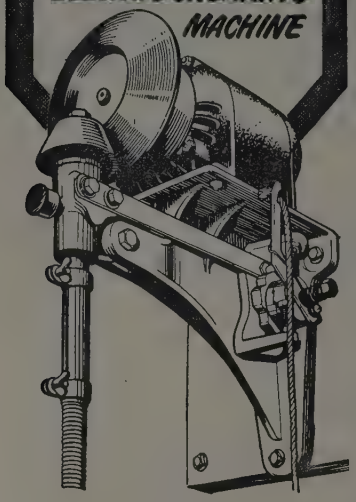

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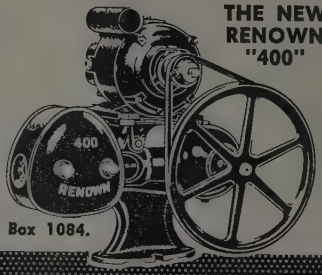

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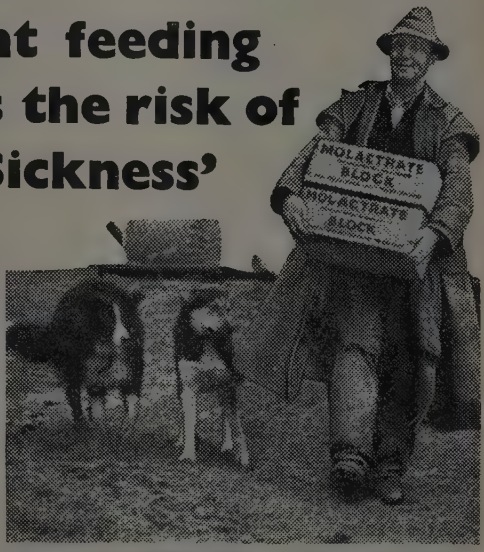

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Generally the seed-producing area is registered, the origin of the seed sown on the area is identified, and the type or strain of plant growing on the area is confirmed by a field inspection at the appropriate stage of growth.

After the seed crop is harvested the sacks are branded and temporarily sealed, pending machine dressing of the seed. The cleaning of the seed is carried out under supervision, after which the sacks are tagged with labels bearing the identification of the seed and are again sealed. At this stage all the sacks of each line are sampled by an officer of the Department of Agriculture. Samples are examined for purity and germination and certificates relating to these factors are issued to the owner of the seed. The samples are also submitted to any plot or laboratory test which may be considered desirable to confirm the plant type of the seed certified.

White clover was the first pasture plant to be included in the certification scheme. In 1929 seed of this species was certified on the basis of the age of the producing pasture. The following season perennial ryegrass was included and at intervals cocksfoot, browntop, Italian ryegrass, Montgomery red clover, cowgrass, short-rotation ryegrass, subterranean clover, timothy, and *Phalaris tuberosa* have been added to the list of certified pasture seeds.

With the exception of short-rotation ryegrass and timothy, natural strains have formed the basic material for the production of certified seed, and in the case of browntop, subterranean clover and *Phalaris tuberosa* natural strains are still the only ones certified. In all other species pedigree strains have been evolved and play a very important part in the production of certified seed.

Selection and Breeding Programme

Coincident with the introduction of a scheme of seed certification based on natural strains of grasses and clovers a programme of selection and breeding of the main species of pasture plants was started by the Grasslands Division of the Department of Scientific and Industrial Research. By the time the first selected material or pedigree strain was ready for release in 1935 seed certification of natural strains had become firmly established and the benefits of an independent means of evaluation of plant type were widely appreciated.

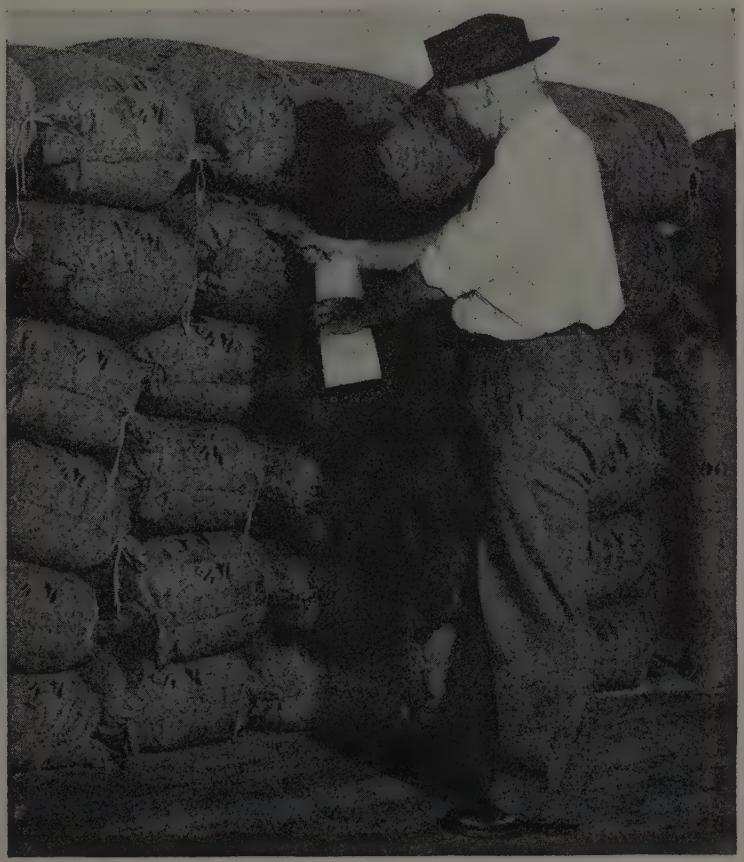
It was at this stage of the development of the New Zealand certification scheme that a very important decision had to be made. Should the certification of pedigree and natural strains be carried on along parallel lines or should the pedigree strains be superimposed on the natural strains, the former gradually replacing the latter and they in turn being replaced by later selections of pedigree strains as these became available? After the fullest deliberation, during which all aspects of the matter were reviewed, it was decided that the latter method should be adopted.

This decision was important. It virtually decreed that pedigree strains under all conditions in New Zealand were superior to natural strains.

It simplified the procedure of seed production because different strains of the same species were not produced under a parallel certification procedure. It meant that certain natural strains, which even before the scheme began were recognised as being of high merit and which later had received the official endorsement of certification, would be relegated to a very minor place.

This, in turn, produced certain repercussions. First, from farmers in districts where superior natural strains were to be found (the effect of the policy regarding these strains can be readily appreciated); second, from certain farmers in some districts who were emphatic that the certified natural strains were superior to the pedigree, just as certain farmers claimed that uncertified strains regarded officially as inferior actually were giving better results than certified natural strains.

It was conceded that under certain conditions of climate and management the pedigree strain might not give the best results, but experience showed that production in such instances was not, in any case, at its maximum and that a change of farm management associated with the use of pedigree strains would lead to better results than in the past. The few and isolated cases which might not comply with the general position were regarded as quite inadequate to justify the maintenance of parallel schemes of seed



A sample being drawn from a machine-dressed line of ryegrass seed.

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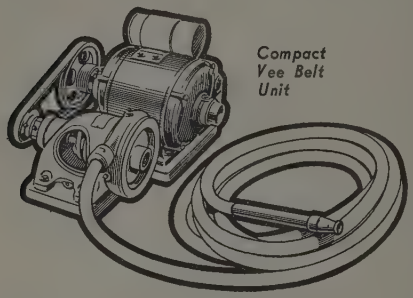

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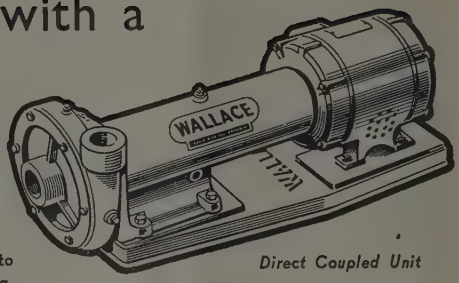

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production for both pedigree and natural strains of each species.

In the adoption of this policy a very big responsibility was placed on the organisations which were responsible for the production and testing of the various pedigree strains before their release. It was essential, also, that a regular supply of nucleus material should be available for multiplication in order that a steady flow of seed would be available for recognition under the certification scheme.

Change Made Gradually

The practical problem of implementing the decision to base certification on pedigree strains had also to be tackled. It was apparent that a sudden and complete change from natural to pedigree strains could not be brought about without completely disorganising the market which had already been built up for certified seeds. The alteration had to be made gradually. The progress which has been made to date with the change from natural to pedigree strains has been dependent on the date the pedigree strain first became available for release and the rapidity with which the already-established areas of natural strains could be replaced. Replacement has been accomplished more speedily with annual than with perennial species.

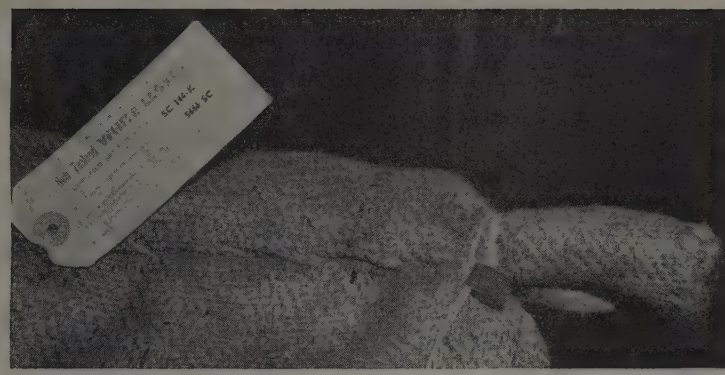
In the certification of natural strains certain precautions were necessary to ensure that plant type was maintained. Generally, two classes of seed were recognised: Mother and Permanent Pasture or Commercial. (The term Commercial has now been dropped in favour of the term Standard.) In addition, with the more perennial species a sub-class of Permanent Pasture (Permanent Pasture First Harvest) was recognised.

Mother seed was the produce of areas showing the highest strain purity with the added proviso for other-than-annual species that the producing area had passed through a specified number of harvest seasons.

Permanent Pasture or Commercial seed was saved from areas showing a lower strain purity or not having the necessary age qualification and First Harvest seed was that obtained from the first crop of a newly established area the type of which had not been confirmed by plot test.

Under the scheme a certain amount of variation between individual crops was always apparent, and as a result the proportion of rejections was correspondingly high.

In the change-over to pedigree strains the first step has been to introduce two further certification classes (Government Stock and Pedigree) of higher merit than the classes already established. In the first stages the already-established scheme of certification was maintained and, in addition, supplies of seed of pedigree strains, when sufficient to release into commerce, were distributed as certified Government Stock seed. Areas sown with this seed produced certified Pedigree seed which, in turn, was used to sow areas eligible to produced certified Mother seed.



The certification tag and seal on a bag of certified Mother white clover seed.

At this stage in the certification scheme, then, certified Mother seed might be of natural or of pedigree strain. The next step has been to restrict to Permanent Pasture or Standard class the produce of areas sown with Mother seed of either natural or pedigree strain. In the more perennial types a further step in the change-over has been the degrading to Permanent Pasture of areas of natural strain which had earlier been accepted for the production of certified Mother seed.

Basis of Certification

The change in the basis of certification from natural to pedigree strain was carried out rapidly with Italian ryegrass, and today all Italian ryegrass seed certified is of pedigree strain. A similar position has also been reached with Montgomery red clover.

With perennial ryegrass and white clover the change has been much slower, but in these species all seed certified in the Mother and higher classes is now of pedigree strain. The complete replacement of natural strains of perennial ryegrass and white clover by pedigree strains is retarded because laboratory tests are used as the sole basis of certification in the lowest class (Permanent Pasture).

A pedigree strain of cowgrass (broad red clover) has entirely replaced the natural strain and with cocksfoot the change-over is progressing. On the other hand all certified short-rotation ryegrass has always been of the pedigree strain. An overseas pedigree strain of timothy is now being replaced by a locally selected strain.

The significance of the various classes of certified seed is shown in the diagram on page 15. Though the various classes are of little importance for pastures for grazing only, they are of paramount importance for areas intended for further seed production, as they provide for the most rapid multiplication with the minimum of contamination from the nucleus stage until all the certified seed produced is of that strain.

Certified Government Stock seed is distributed to selected farmers primarily for further seed production. Certified Pedigree seed is freely marketable within New Zealand, but its export is not permitted. This class of seed is also intended primarily for further seed production. Subject to the meeting of local requirements certified Mother seed and certified Permanent Pasture or Standard seed are permitted full freedom of market in any overseas country.

The quantity of certified Government Stock seed released each year is regulated, as far as practicable, to an amount considered ample to enable the total New Zealand seed crop to be produced from that release within three further stages of multiplication. The demand for Government Stock seed usually far exceeds the quantity available, but the demand is regarded as an economic one and is not in any way related to the real purpose of the release of this class of seed.

Improved Pedigree Strains

When an improved pedigree strain of any species is produced it is fed in at the top of the certification scheme as certified Government Stock seed. From there it permeates into all classes of certified seed and any radical change in procedure or clas-

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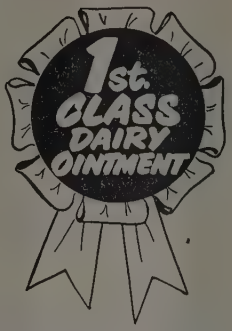

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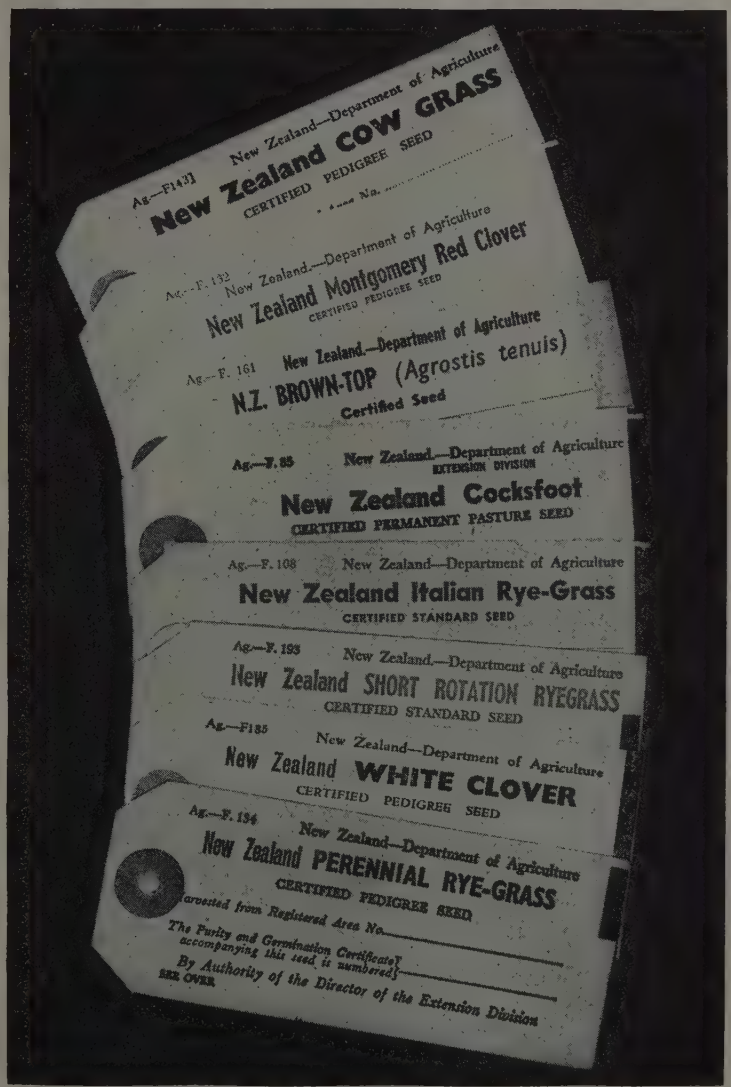
sification of areas is thus unnecessary. In the intervening years the standard of the pedigree strain is maintained by annual release of reselected material from the breeder.

With very few exceptions the strain purity of all certified seeds, irrespective of class, is uniformly high. To that degree it is immaterial to the grazing farmer what class of certified seed he sows, except that in some species he must purchase a higher class to be certain of obtaining seed of pedigree strain. The certification classes and their relationship are, however, of great importance to the seed grower, as they show the number of stages by which each class of seed is removed from the breeder and they result in the most rapid multiplication to the stage where all certified seed represents the latest possible release.

The procedure adopted has simplified the whole question of maintaining strain purity and has made it possible to eliminate age qualification, previously essential in certain species. Further, it has enabled a much higher general standard to be maintained in all certified seed without the disturbing feature of a relatively high proportion of crops being rejected from certification.

The four recognised classes of certified seed provide a clearly defined channel of multiplication of the pedigree strain from the breeders' hands to the ultimate user. They do not necessarily represent seed of differing qualities; rather, they represent seed having a quality as even throughout as possible, and they indicate the stage of multiplication of the particular material. To that extent no tests could differentiate between, say, Italian ryegrass certified as Pedigree seed and much of that certified as Standard seed. The justification for the classes and


New Zealand—Department of Agriculture
New Zealand COW GRASS
CERTIFIED PEDIGREE SEED
New Zealand—Department of Agriculture
New Zealand Montgomery Red Clover
CERTIFIED PEDIGREE SEED
New Zealand—Department of Agriculture
N.Z. BROWN-TOP (Agrostis tenuis)
Certified Seed
New Zealand—Department of Agriculture
EXTENSION DIVISION
New Zealand Cocksfoot
CERTIFIED PERMANENT PASTURE SEED
New Zealand—Department of Agriculture
New Zealand Italian Rye-Grass
CERTIFIED STANDARD SEED
New Zealand—Department of Agriculture
New Zealand SHORT ROTATION RYEGRASS
CERTIFIED STANDARD SEED
New Zealand—Department of Agriculture
New Zealand WHITE CLOVER
CERTIFIED PEDIGREE SEED
New Zealand—Department of Agriculture
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Seed certification tags for different classes of grasses and clovers.

the conditions of certification within them is that they permit rapid multiplication and correspondingly less opportunity for contamination during multiplication. In addition, by a simple procedure, strains of most species at a certain stage removed from the original selection automatically pass outside the scope of the certification scheme.

The first and most obvious effect on farming of the availability of certified grass and clover seeds has been that buyers have been given an assurance that the seed they buy is of good strain. In addition a channel has been provided whereby the work of the plant breeder in developing pedigree strains is passed on to the farming community rapidly and assuredly.

A knowledge of strain coupled with a knowledge of purity and germination of the seed has enabled a more accurate evaluation of the seed, and buying and selling have been undertaken with more confidence. Though it is almost impossible to measure the effect of the scheme on individual species, a comparison of the position of some species before the scheme was instituted and the position today is given below.

Perennial ryegrass: Before the introduction of the scheme 25 per cent of the perennial ryegrass seed harvested might have been expected to reach the certification standard of the first years of certification. Today when a much higher standard applies 75 per cent of the perennial ryegrass seed produced is actually certified, and it is not difficult to believe that the quality of much of the remainder is not far short of the present standard for certification.

Italian ryegrass: When certification was first introduced no local strains reached the standard of certification set. Today 70 per cent of the harvest is recognised under certification. This is all of pedigree strain, which is superior to the imported strains which provided the first material to be certified.

Short-rotation ryegrass: Only the certification scheme has made it possible to preserve with certainty the identity of short-rotation ryegrass.

White clover: When a laboratory test for white clover certification was first introduced in 1937 the total production amounted to 485 tons, of which 40 per cent was accepted for certification. In 1947 production had reached 2,648 tons, yet, despite a higher certification standard, 70 per cent of the seed was certified. In 1955 over 90 per cent of the seed harvested was certified.

Montgomery red clover: This seed would not have been identifiable from cowgrass without a scheme, such as that provided by seed certification, under which it could be recognised.

There are other less obvious, though no less important, effects of the seed certification scheme. Before the scheme was introduced it was essential with perennial species, if quality was to be maintained, to harvest seed from old pastures. This uneconomic process can be eliminated under a certification scheme emanating from a nucleus supply of seed derived from regularly selected material of pedigree strain, and farmers have been able to take the fullest advantage of the heavier and cleaner seed crops harvested from younger pastures.

The undesirable practice of saving seed from pastures of mixed ryegrass species has been almost entirely eliminated. Seed production under certification has become primarily an activity of the arable areas where crops and pastures are associated in the farming practice. The saving of seed though not a primary activity on most farms, is nevertheless a planned one.

Generally, the whole outlook on pasture seed harvesting has been lifted from that of a haphazard, catch-crop undertaking to be indulged in at the whim of the farmer and the season to that of an operation which warrants careful attention and planning. This change in the attitude to seed production, though perhaps affected to some extent by other factors, has been the result largely of the certification scheme.

Effect on Pastures

From the pasture aspect, also, certification has wrought some changes and pasture - management practices have had to be adjusted to obtain the best results from the improved strains. Though the farmer is the best judge of the improvement in quality of pastures due to the use of certified seeds, it can be said that on some farms the use of certified seeds has revolutionised farming practices. Nowhere is this more apparent than in Canterbury, where, instead of the run-out pastures or perhaps bare paddocks which demanded reploughing within 3 or 4 years of sowing down, good pastures can now be maintained for a number of years.

The reduction in the acreage of arable crops in this district, though not perhaps a direct result of the use of certified seeds, has been feasible because pastures established with these seeds have not required such frequent renewal. Conversely, the increased grain yields obtained when pastures established with certified seeds are broken up are a reflection of the increase in fertility which can be obtained through the heavier stocking possible on a good pasture.

That the United Kingdom gives preference to New Zealand certified seeds and goes so far as to prohibit imports of uncertified seed of some species is additional evidence of the value to New Zealand of certified seeds and of the certification scheme generally.

If a farmer buys certified seed, however, he must not expect, automatically, perfection in all respects. Certification refers only to the strain of a plant and gives no assurance as to the purity or germination of the seed certified.

Purity, or rather impurity, is a complex factor unrelated to strain and requires individual interpretation, depending on the conditions under which the particular line of seed is to be sown; germination is a factor which can vary from one period to another in the one line of seed and it is materially affected by storage conditions. Assurance on either of these factors cannot be incorporated satisfactorily in a certification scheme designed primarily to identify strain, but both can be determined by an analysis of a seed sample drawn at any time.

As a matter of routine all lines of certified seed are sampled by an official of the Department of Agriculture and examined for purity and germination, and every certification tag carries a warning to the buyer to inspect the certificate of that analysis before completing the purchase of his seed. The certification tag is endorsed with the identity of the line of seed, the same identity appearing on the corresponding certificate of analysis covering the purity and germination of the seed. A certification insert slip is also included inside the sack when the identity of the seed is an essential prerequisite to the future certification of an area sown with that seed.

The New Zealand certification scheme, introduced originally to identify seed of superior natural strains, has been modified to meet the different requirements of seed of pedigree strains. It is undertaken to provide the buyer with an assurance as to the strain of the seed and not for any specific benefit it may confer upon the grower of the seed.

The strains of grass and clover seed under certification have been selected for conditions in New Zealand, because New Zealand is still the biggest user of the seed it produces and it is only fortuitous that New Zealand strains may meet the needs of overseas countries also. That they do so is shown by the export seed trade, valued today at about £2,000,000. However, the scheme of seed certification takes its place in New Zealand agriculture essentially as an aid in lifting the production of animal foodstuffs to the highest level.

INOCULATION OF CLOVERS INTRODUCED INTO TUSSOCK COUNTRY

By J. C. TOTHILL,
Instructor in Agriculture, Department of Agriculture, Alexandra

THE role of clovers, both oversown and drilled, is becoming increasingly important in the tussock country of the South Island. There are many environmental limitations to the successful establishment and maintenance of a well balanced clover-tussock pasture. The most important considerations are the time of sowing, method of sowing (whether drilled or broadcast), fertiliser requirements, inoculation of the clover species, and management after sowing. Of these, until recently, inoculation of the clovers has been considered least important.

TRIALS in Central Otago have shown spectacular responses to the inoculation of drilled clovers in both higher-rainfall tussock country and lower-rainfall depleted country. This is interesting when it is considered that in the higher-rainfall tussock country of the Lakes district some large areas have been successfully oversown with clovers without inoculum. In seasons when summers are dry, however, uninoculated clover oversowings may take 2 or 3 years to reach the stage that a wetter-season sowing will reach in 1 year. It is here that inoculation of clover may be valuable.

In drilled sowings inoculum gives a significant boost to the establishment of clover plants, which can be important in a climate where summer drought can be expected each year. If it is possible to hasten the rate of establishment of the sown clovers during the short period of adequate soil moisture in spring, it is likely that these plants will withstand the rigours of a summer drought better and, if there is little autumn rain, the greater effect of cold winter and its accompanying frost lift.

These pilot trials have provided ample evidence that the simple operation of inoculating legume seed to be drilled is worth while. Where it is possible and practical to drill in seed, inoculation will be effective. Early spring drilling has been proved advantageous for legumes, but this can be done only when the ground has thawed. At that time the seed can be covered and the inoculum thus protected.

With seed that is to be surface sown, however, there is the problem that the most desirable times of sowing—winter and early spring—may not provide conditions under which the inoculum is effective. Early sowing takes advantage of frost action for seed coverage and also allows maximum advantage to be taken of spring conditions for early establishment, but the effect of exposure during winter and early spring on the viability of the inoculum is not known.

Seed inoculation is only one aspect that should be considered when clover is introduced into native grassland. However, it is a factor that in the past has not been considered, but it is one which may well extend the range of country, both in altitude and dryness, on which clovers can be grown successfully.

▼ Left—Zig-zag clover not inoculated before sowing. Right—Clover inoculated before sowing.

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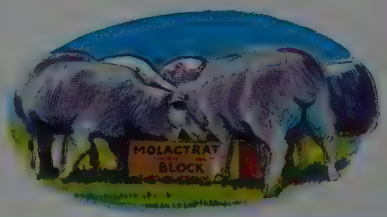

WEED IDENTIFICATION AND CONTROL

By D. I. GLUE, Instructor in Agriculture, and L. J. MATTHEWS, Weeds Research Officer, both of the Department of Agriculture, Wellington

This is one of a series of articles illustrated in colour to appear in the "Journal" from time to time in which identification and control of various weeds will be discussed.

RAGWORT (*Senecio jacobaea*) is one of the most widely known and easily recognised pasture weeds, and its control has probably aroused more interest among farmers, local bodies, and noxious weeds inspectors than that of any other weed. Despite this widespread interest ragwort is not such a serious weed as many people believe, and in high-producing, well managed pastures it is of slight importance.

THE weak point of the ragwort life cycle, and one which makes possible its control, is the inability of its seedlings to establish in a dense, thrifty sward of high-producing pasture species. Consequently the weed can invade good pastures only when they are in the early stages of establishment before they have had time to thicken up and develop into weed-resistant swards, or in places which have been bared through factors such as pugging or shading.

The plant contains a toxic alkaloid, jacobine, and is reported to have caused poisonings among sheep, cattle, and horses. However, under New Zealand conditions sheep appear to be able to eat considerable amounts of the plant without harm. They eat ragwort so readily that it is not a problem even in very poor sheep pastures. Under concentrated grazing by sheep it assumes a small, low-growing rosette form, is unable to set seed, and rapidly becomes of negligible importance in the sward.

Unless forced to do so dairy cattle rarely eat the plant, but they will do so more readily after it has been mown or sprayed with weedkillers. In the past it has often been the practice on ragwort-infested dairy farms to run a small flock of sheep for ragwort control.

Any factors which weaken or open a sward under dairy cow grazing may lead to ragwort invasion. Conversely it is of little use employing weedkillers to kill ragwort unless measures are also taken to build up the sward to a level where it can resist the ingress of further ragwort seedlings. Ragwort sometimes behaves as an annual, but mainly as a biennial, and it is rare for an individual ragwort plant to survive for more than 3 years. Many farmers have discovered that even under dairy grazing and without the use of weedkillers ragwort can be made to disappear from a pasture by sward improvement measures alone.

Ragwort is a prolific seeder, and though most of the seed is deposited near the parent plants, enough of it is airborne to ensure that it is one of the most widely distributed weeds in the country. However, as it is not uncommon to see ragwort-free paddocks which are surrounded by dense infestations, it is quite apparent that it is not the amount of seed deposited on a pasture which determines its spread but the capacity of the sward to resist infestation.

Undoubtedly the most effective chemical weedkillers for ragwort control are preparations of 2,4-D. Preparations of MCPA are slightly inferior. The water-soluble salts of these materials control ragwort from young seedlings and regrowths until flower stalk initiation. After flower stalk initiation the esters of 2,4-D are best employed. Young plants, whether seedlings or regrowths, have been successfully controlled by the salts and esters of 2,4-DB at up to 2 lb. acid equivalent per acre. To control plants at the same growth stage with MCPA and 2.4-D rates of 1 lb. to 1½ lb. acid equivalent per acre are sufficient. For ragwort at advanced stages of growth the esters of 2,4-D are best applied at 1½ lb. to 2 lb. acid equivalent per acre.

In the past sodium chlorate or sodium chlorate-based materials were used extensively for ragwort control. These materials gave effective control of seedlings but failed to control established plants unless applied at soil sterilisation rates or in conjunction with hard sheep grazing or pasture improvement. Sodium chlorate or chlorate-based compounds are sometimes applied to ragwort in an advanced stage of flowering. This usually results in a larger percentage of viable seed being set. If dusts are preferred to liquids, lime or superphosphate mixtures containing the sodium salt of 2,4-D should be used.

In a newly established pasture 2,4-DB should be applied. At 1 lb. to 2 lb. acid equivalent per acre this material will give control of all plants except perhaps regrowths from mature rootstocks. The advantage of the material is that clover is not suppressed. For established pastures 2,4-DB may be applied in August or September and surviving plants controlled with 2,4-D in the early-flowering stage. If this procedure is adopted, minimum damage to clovers will occur. This is important, as in many cases the incidence of ragwort has been increased in poor pastures owing to clover suppression with 2,4-D. For permanent ragwort control the fertility status of the area should be raised. Weedkillers should be used as a tool to keep ragwort suppressed until the fertility status is increased to a level at which ragwort becomes of little consequence.

The prosperity of New Zealand stems largely from the vision of its farmers who enjoy a world-wide reputation for adaptability and progressiveness. Improved farming techniques increase the productivity of the land but also, in some cases, accentuate the hazards of stock disease. New Zealand farmers have been quick to take advantage of new methods of disease control by vaccinating their stock against such ailments as pulpy kidney, blackleg, contagious abortion, distemper; and the Tasman Vaccine Laboratory Limited, is proud to be associated with them in their endeavours.

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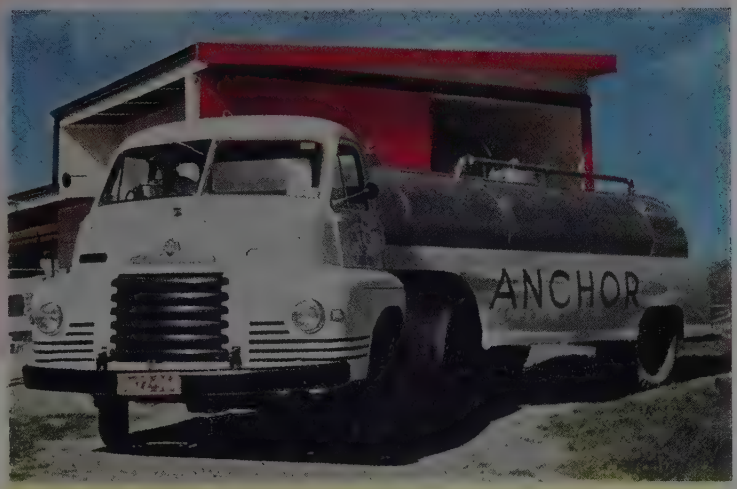
Milk Collection by Tanker from Dairy Farms

THE transport of petrol in bulk by road and rail tankers and storage in totally enclosed tanks have been practised for many years. This system of tanker transport in bulk for other liquid products, such as ale, has now come into favour in New Zealand, and the system is now used for inter-factory transport in bulk of milk and other liquid dairy products such as whole milk, skim milk, and buttermilk, and for the transport of ice-cream mix from a central factory to ice-cream packing plants.



A farm tank stand with the door open and the tanker in position for loading.

By G. PURVIS,
Superintendent of Butter Instruction, Department of Agriculture, Hamilton

MILK collection by tanker from farms began in the United States of America about 9 years ago. The system of dairy farming catered for there initially was a collective one which was very different from New Zealand dairy farming. The herds were large, varying from 200 to 1,000 cows, housed on relatively small holdings, the cattle being stall fed. This grouping of animals provided large quantities of milk at each collection point, a situation conducive to an economical tanker collection service. The system proved very successful and it was obvious that it could be applied with advantage to New Zealand.

Tanker collection from farms in New Zealand is understood to have been considered by the New Zealand Co-operative Dairy Co. Ltd. in 1940, when difficulties associated with lack of manpower and shortage of cans were becoming acute. Efforts were made at this time to investigate the setting up of such a system. However, owing to unforeseen delays it was not until the 1949-50 season that anything tangible was achieved. During that season the scheme was introduced experimentally on 10 farms very close to one another in the Waitoa milk powder factory supply area.

This experiment proved highly successful and since then that company has extended the service considerably until today it has a fleet of about 120 tankers collecting milk from 2,700 suppliers and 8 tankers for inter-factory transport of milk, buttermilk, and cream.

Other dairy company directors in the Waikato and Bay of Plenty became impressed with the advantages of the tanker service provided by the New Zealand Co-operative Dairy Co., and 10 other dairy companies in those areas have converted their milk collection systems from cans to tankers; others are considering doing the same. In addition, a number of dairy companies in other provinces have introduced tanker collection.

The system has proved so popular for milk collection for factory supply with those companies which have adopted it that it is considered it will be generally used in all suitable areas within the next few years. Milk marketing boards in the United Kingdom have begun tanker collection from farms.

The system is being used in New Zealand for collection of milk for town supply in at least one centre, and officers of the Dairy Division have on request made surveys of farms of two other town milk supply groups regarding the change over from can to tanker

A tanker driver recording the weight of milk in the farm vat before it is pumped into the tanker.

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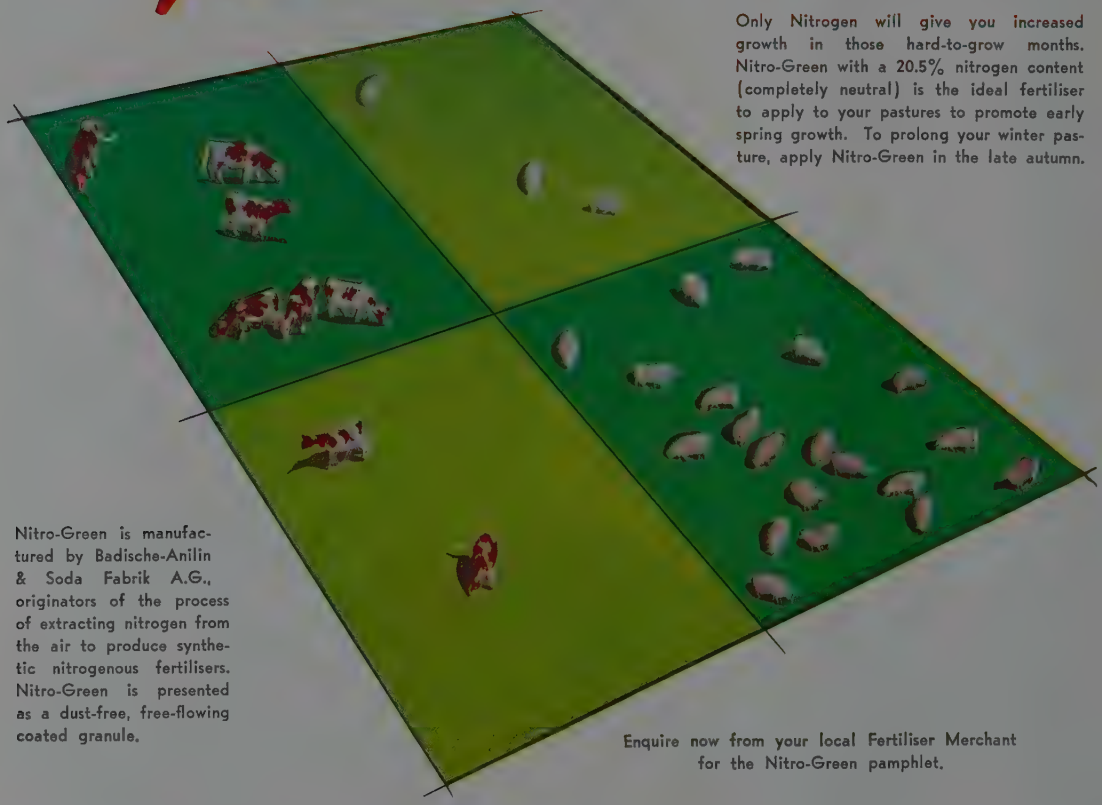

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pick up. One group decided to introduce the system this autumn and the other has the matter under consideration. It is considered that when the advantages of the system are fully realised it will prove as popular for suitable areas as in the collection of milk for factory supply.

Suitability of Areas for Tanker Collection

In the Waikato the areas covered by the tanker service are ideally suitable for this type of collection. On the majority of routes the cow density is such that a 1,500- or 1,600-gallon tanker is able to collect three loads in the morning and two in the evening. It must be remembered, too, that milk powder factories are ideal for the use of this service, in so far as there is not the necessity to deliver the milk to the factories by 9 o'clock in the morning as would be necessary for cheese manufacture.

It has been found also that all back roads in the area are gazetted as class 3, which classification permits of a 5-ton axle loading. Most roads serving dairy farms in New Zealand would have a similar classification. For this reason the 1,500-gallon tanker was at first widely adopted, but tankers of 1,600 gallons capacity are now being made and are permitted on class 3 roads. Tankers are mounted on a quick release articulator which is drawn by a tractor with a very short wheel base. In very steep country a four-wheel vehicle equipped with a 1,000-gallon tanker having the pump driven off the power take-off would be suitable. One company is operating this equipment successfully under these conditions.

Design of Farm Vats

In U.S.A. the weight of milk was calculated by the insertion of a graduated metal dip-stick into the milk in the farm vat. This was not considered sufficiently accurate for New Zealand conditions and took too long. Consequently it was necessary to design a vat to meet New Zealand dairy industry requirements. A circular vat conforming to requirements of the Dairy Division of the Department of Agriculture was designed with a domed bottom and a fall to the gullet and tap, the domed bottom to give stability and to avoid the movement associated with flat sheet and the fall to the gullet to enable quick and complete discharge of milk.

For accurate measurement of milk a graduated scale and accompanying transparent plastic tube open at the top are fitted perpendicularly to connections outside the vat. This tube is somewhat similar to a gauge glass on a steam boiler, or the glass tube fitted on kitchen water heaters. The surface of the milk in the transparent plastic tube is thus subject to the same atmospheric pressure as the milk in the tank. As the milk rises or falls in the tank so does the milk in the transparent tube, with the result that levels in both are equal, thus making it possible to read the weight of milk from the graduated scale.

A loop driveway and a farm tank stand. Such a driveway greatly facilitates collection of milk, as the tanker does not have to back, and this lessens the possibility of damage to the stand and the tanker.

Capacities and dimensions of vats are as follows:

Capacity	Height of vat	Height including stand
lb.	ft. in.	ft. in.
1,800	1 10½	3 6
2,400	2 5½	4 3
3,200	3 3½	5 0
4,500	4 7½	5 9

Irrespective of size all vats have a diameter of 52.39 in. They are made of 18-gauge stainless steel with a rolled edge at the top and are fitted with stainless-steel covers hinged in the centre from a cross bar. To prevent contamination these covers should be closed at the beginning of milking and kept closed until the milk is picked up by the tanker.

The vats are fitted with three adjustable legs and provision for sealing, so that they can be levelled and sealed when installed on the concrete stand at the milking shed. The milk measurements are recorded in pounds computed from calibration marks ⅛ in. apart on the scale bar, each space representing 10 lb. The Weights and Measures Section of the Department of Labour insists on being able to check the accuracy of these measurements by volume. For this purpose the vats have calibrations in gallons at one-quarter, one-half, three-quarters, and full. At the works of the manufacturer the vats are levelled and this scale is tested, sealed, and stamped by an Inspector of Weights and Measures.

Tanker Equipment

Tankers are made of 10-gauge stainless steel, and are elliptic in cross-section. They are made in two compartments, each of which is baffled. The relative dimensions of the 1,500-gallon size are 16 ft. x 5 ft. 10 in. x 3 ft. 10 in., with a 3 ft. boot at the back.

Originally these tankers were made with a single compartment fitted with two baffles, but it was found that where hilly country had to be traversed and the tanker was partly empty there was a tendency for the milk to run to the back of the tanker with the result that there was loss of traction on the driving wheels. The tankers are now built so that the front compartment is filled first and the overflow runs into the next compartment, thus assuring that the weight is never transferred from the centre axle. A hand-operated 6 in. flap valve between the compartments allows pumping out.

A vacuum release valve is fitted in the lid of the first tank and the lid of the rear one contains a pressure release valve. The boot at the rear of the tank houses a 5-horsepower electric motor directly coupled to a 2½ in. centrifugal pump which has a capacity of 9,000 gallons per hour. The boot also houses a 3-gallon can for receiving excess sample milk, 30 ft. of flex for connection to a power unit in the farm vat stand, a sample tub, and three crates of sample bottles.

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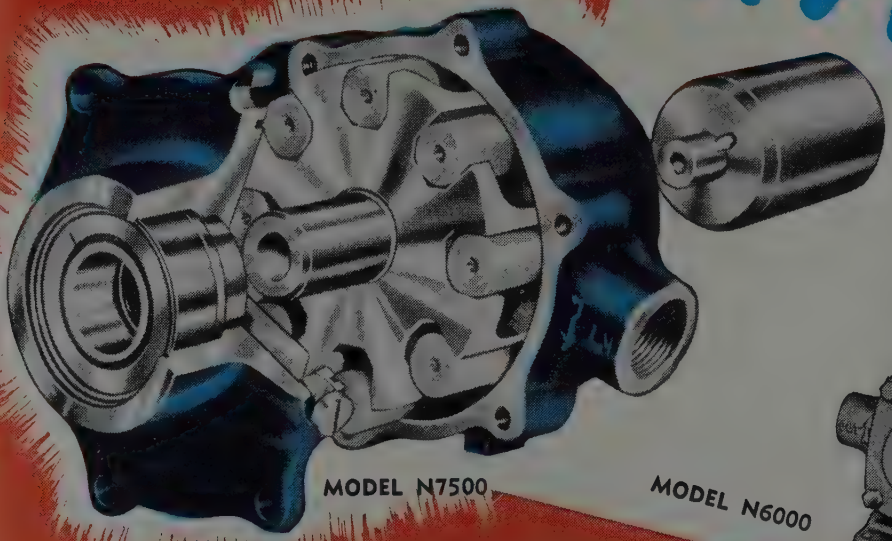
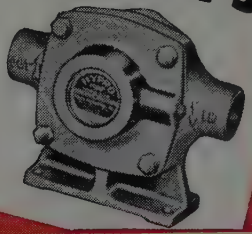


MODEL N7500

MODEL N6000



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A 2½ in. sanitary milk hose provides a flexible connection between the pump on the tanker and the farm vat. When not in use this hose is carried on the tanker in a special fitting designed to prevent contamination and the entry of dust and grit.

The method of sampling the milk is unique. A small sample tube or jet is fitted into the delivery pipe between the pump and the first compartment on the tanker. Extraction of the sample is continuous when the pump is in action, and the bulk sample, collected in a dipper in the boot, is subsequently transferred by the driver to the sample bottle belonging to the particular supplier.

Two air scoops are fitted into the top of the boot, and there are louvres in the doors. These ensure that there is always a good current of air passing through the compartment and prevent the suction of dust and fumes from the rear of the vehicle when it is in motion.

In place of electric power for pumping, petrol-driven motors may be used. These are an advantage if there is a breakdown in the electricity supply and in sheds to which electricity is not connected. The engines are housed in a special compartment built into the skirt of the tanker at the left hand side of the boot. These petrol motors have a 4-horsepower rating with development to 6 horsepower.

Weight Recording

Each tanker has a fitting in the left hand door of the boot with a system for recording the weight of milk. The system is a loose-leaf one and provides a record in triplicate of the milk supply from each farm for each period. All computing is based on a tri-monthly period system and sheets are changed on the 1st, 11th, and 21st day of each month.

The driver writes the weight of milk direct on to this docket sheet and a duplicate carbon copy is forwarded at the end of each period to the supplier.

The record sheets have provision for three grades of milk, finest, first grade, and second grade, but the weight is always recorded in the finest column. If the milk, when graded at the factory, is lower than finest, the milk weight is entered in the appropriate column and the original entry struck out. On his next run the driver leaves a card at the dairy advising the farmer of the lower-grade milk.

Factory Equipment for Tanker Collection

The stages of factories of the New Zealand Co-operative Dairy Co. Ltd. that were originally equipped with scales for milk weighing have for tanker collection been lowered and now contain a number of 3000-gallon, stainless-steel, horizontal, totally enclosed tanks and power plugs for connection to tankers' electric motors. The landings on which the tankers back to discharge their loads have a special fall for quick draining and kerbing to stop tankers at the desired point when they are backing.

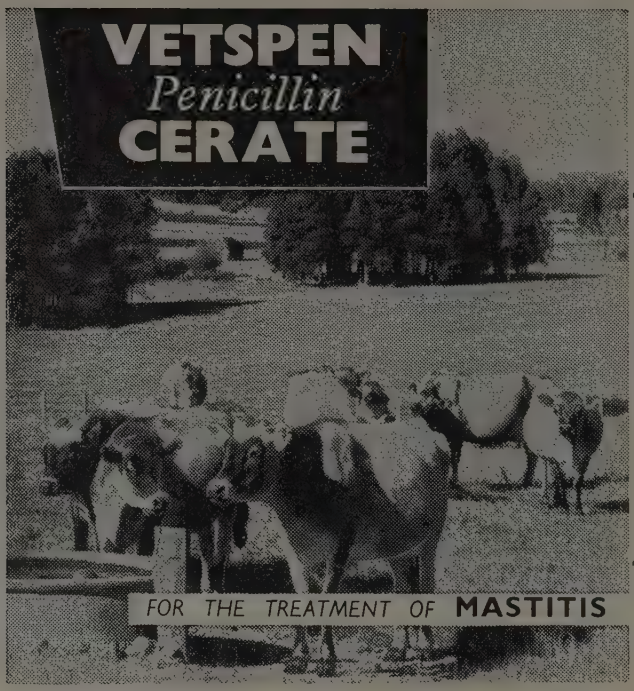
Cleaning of Tankers

Cleaning of tankers was first done by hand, but it did not prove satisfactory owing to the hot, steamy conditions in the tanker while it was being washed. A system was therefore devised for doing this work mechanically.

On a stage in the building where tankers are washed a circular vat of 180-gallon capacity is installed. The vat is filled with water to which is added 1 quart of "Teepol", plus about 7 lb. of soda ash. This mixture is brought to boiling point.

The tanker is first rinsed with cold water to reduce precipitation of

Tankers at the milk reception stage and in the yard of a spray milk powder section of a modern dairy factory.



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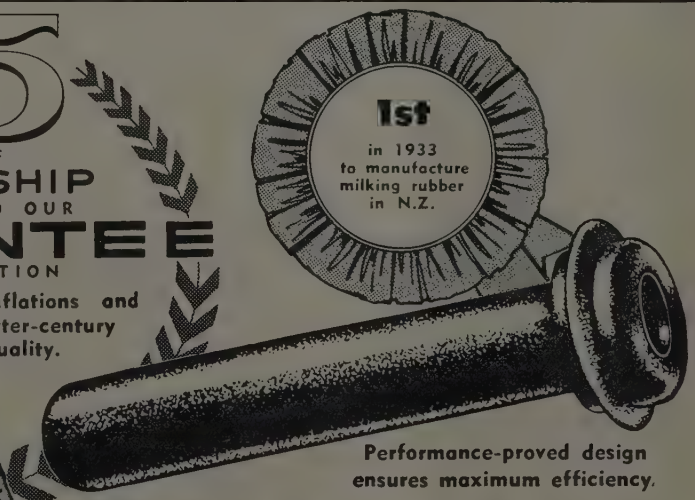

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milkstone and two sprays with covers attached are lowered into the manholes of the tanker by pulleys and ropes. A hose is connected from the vat to the tanker's own pumping equipment and the solution is circulated through all the pipes in the system and at the same time the sprays give the interior of the tanker a thorough washing. Circulation is carried out for about 20 minutes. This mixture, made up fresh each day, is used for 6 days in the week, and on the seventh day an acid detergent is circulated.

Milking Shed Access

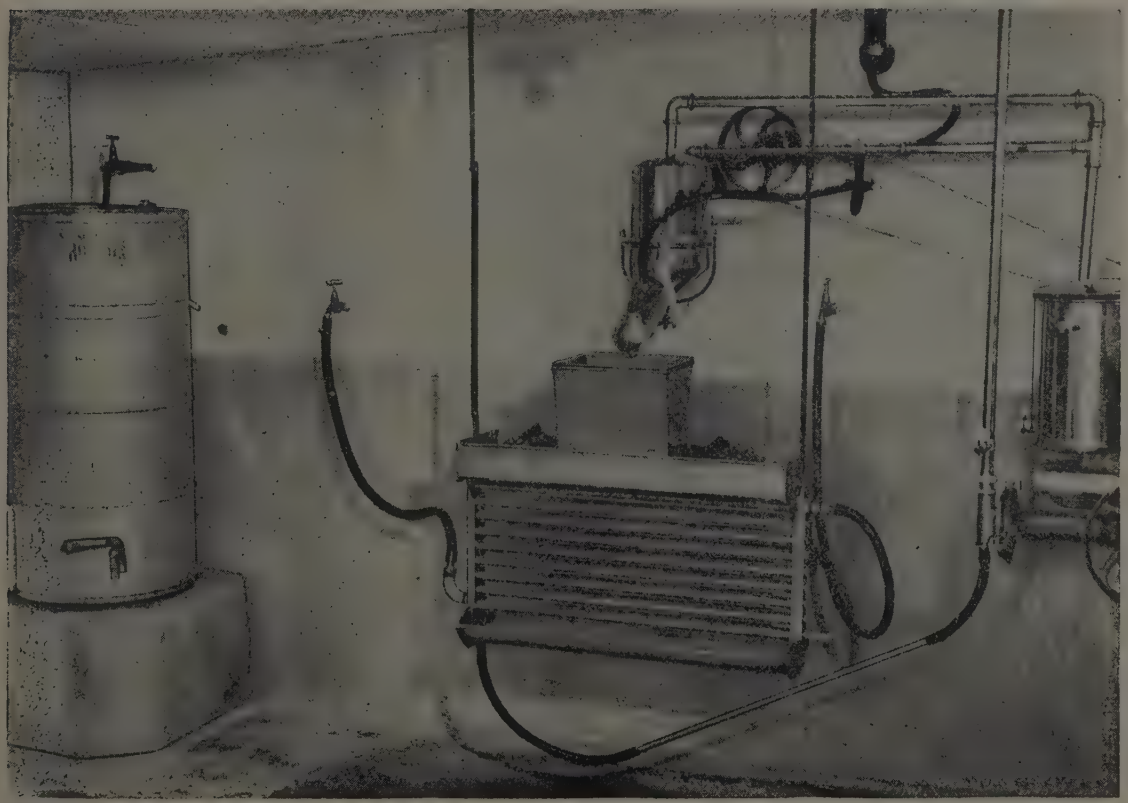
The first essential in setting up a tanker service is the provision of a good all-weather road to the milking shed. This road should be at least 11 ft. wide, have a good surface, and be fenced or have a cattle stop at the entrance off the road.

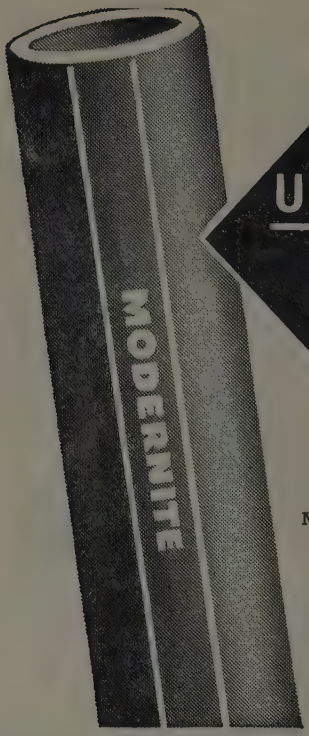
Close to the vat stand the road should form a loop to provide for ease of turning of the tanker in forward travel and to avoid the necessity for backing. The loop or the milk vat stand should be placed so that the vat

MILK COLLECTION BY TANKER

After the driver has recorded the weight of milk, connected the hose to the tank, and plugged the flex into the power unit he lifts the lid of the tank and stirs the milk. He continues to stir the milk while it is being pumped. The equipment shown in the illustration below is on the stand behind the tank, and this layout is very convenient for tanker collection of milk.

▼ An electric water heater is conveniently placed in a corner near the milk releaser, filter, and cooler.





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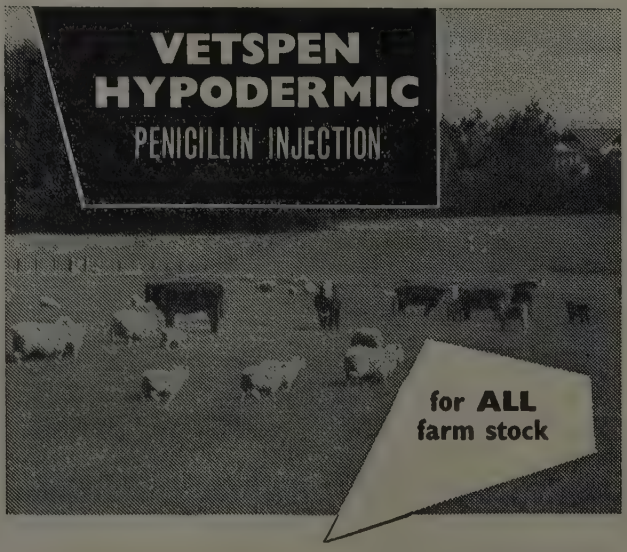

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outlet is facing the driver's side of the tanker, which facilitates stopping in the correct position for milk pick-up and lessens the likelihood of damage to the stand or the tanker. This also saves time in pick-up, as walking is reduced to a minimum. The diameter of the circle represented by the outer edge of the loop road should be not less than 52 ft. The diameter of the inner circle without the loop road should be not less than 30 ft.

Vat Stage

The vat stage should be sited adjoining the milking shed or preferably be part of it for convenience of supervision during milking, to keep pipe lines down to a minimum, and for washing and drainage. With this layout drainage can be linked up with the main drainage from the milking shed. The floor of the stand should be at least 3ft. 6in. above ground level to provide for gravity flow from the vat to the tanker pump and thus avoid air locking on the suction side of the pump. Stages should be provided with concrete walls 1 ft. 6 in. to 2 ft. above floor level and a suitable fall in the floor to the drainage point at the back. A concrete landing in front falling to the channel formed along the front of the stage should also be provided to convey the drainage to the main milking shed drain. These provisions will facilitate maintenance of the hygiene of the landing and stage. The stand should be provided with electric light and a power point.

Where possible the aim should be to have the opening for milk pick-up facing in a southerly direction to avoid direct sunlight on the vat while it contains milk, which will cause rapid deterioration. If the opening cannot be faced in a southerly direction, a door should be provided to exclude sunlight.

The Dairy Division of the Department of Agriculture has prepared a plan of a suitable milk vat stand which can be had on request. The Department's Farm Dairy Instructors throughout New Zealand can give full information covering siting of loops, and design and siting of tanker vat stands, and will be pleased to visit milking sheds or licensed dairies and give advice.

Method of Collection

The introduction of tanker collection has resulted in an all-round improvement in the handling of milk from farm to factory. Not only has the normal manual work on both farm and factory been reduced considerably, but the actual collection is quicker.

In a well organised system with farm dairies located reasonably handy to the road it is possible for a driver to leave the main road with the tanker, carefully perform the dairy shed routine necessary for tanker collection (including reading of the milk weight when the milk in the vat is undisturbed and stirring the milk while it is being pumped from the vat), and complete the pick-up, farm gate to farm gate, in about 4½ minutes.

Discharge of Milk at Factory

At the end of each run the time taken to empty the tanker at the factory, turn round, and get under way again is about 10 minutes. During the stop the milk samples are handed in to the test room and others picked up if required.

Samples for butterfat test and grading are taken from the samples handed in and the bottles are then washed and sterilised in readiness for the next run.

At the end of each morning or evening run the record system is placed by the driver in a cabinet in the office for safe keeping. With about 4½ minutes for each pick-up the time for a round trip of 19 miles, embracing 10 farms, is under 2 hours.

Costs of Converting Farms

Though costs will vary from farm to farm, generally roading will cost about £12 per chain. Cattle stops cost approximately £50 if built by the farmer himself and £80 if a contractor does the work. Stands would cost up to £100 at the most. A 400-volt plug and socket with light would cost about £14. If the switch-board in the shed is not suitable to take the extra wiring, additional work to the value of £22 may be necessary.

During early February 1956 a survey was made by the Dairy Division of a number of licensed dairies in the Waikato to ascertain the costs of conversion from can collection of milk to tanker collection. Details are as follows:

Number of dairies surveyed and costed, 56

Range in cost, £45 to £245

Average cost, approximately, £108

The costs given do not include the cost of farm vats. These are as follows:

Capacity gallons	Non-insulated £	Insulated £
180	123	180
240	130	204
320	145	234
460	175	273

In the above survey, costs, including those for uninsulated vats would range from £168 to £420. If the switchboard was not suitable to carry the extra wiring, £22 would have to be added, which would make the lowest £190 and the highest £442 approximately.

Costs of a 1,600-gallon tanker would be as follows:

	£
Tractor unit (one only) ..	1,782
Tractor trailer (complete with accessories)	3,498
	5,280

Economics of Tanker Collection

In areas similar to Waitoa, Waharoa, and Te Awamutu the savings in vehicles are considerable. A tanker can carry 1,600 gallons of milk and keep within the limits specified for class 3 roads, but a flat-top vehicle carrying cans would be able to shift 1,200 gallons only under similar conditions.

In addition, the turn-round time at the milk-treatment station or factory is much shorter than would be necessary with cans, thus reducing waiting time at the stage to a minimum. A further large saving is in the number of receiving hands required at the stage. One man only is necessary to receive milk under the tanker system at a factory similar to that at Waitoa, where previously 17 were employed for can receiving when supply was 28,000 gallons per day, approximately one-quarter of what it is today. Against this, of course, is extra labour employed in tanker washing, which, however, is infinitely less than that needed for reception of milk in cans.

From the farmer's viewpoint there may not appear at first glance to be a saving when it is remembered that he must provide a shed and stand to house the vat, also power point, light, and cattle stop, as well as good access. However, he no longer has to provide and maintain cans, and from the convenience aspect alone the tanker system would be worth while.

Quality Aspect

Farm vats with lids closed as they should be at the beginning of milking give good protection against entry of foreign matter. Milk in transit in the tanker is also fully protected against foreign matter.

Bacteriological tests carried out on milk supplied under each system under average conditions have indicated that bacterial growth is much greater under can collection than under tanker collection. Under tanker collection, however, it is of paramount importance that a uniformly high standard of milking shed hygiene be maintained at all dairies, as bad milk from one producer could cause serious deterioration in the quality of a whole tanker load.

Weighing and Sampling

The Dairy Division has carried out extensive checks on weight reading and sampling and has found that if both are carried out according to instructions they compare quite favourably with weighing and sampling at the factory.

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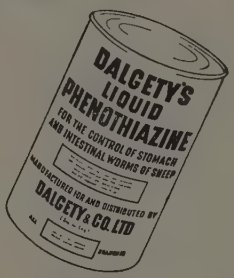

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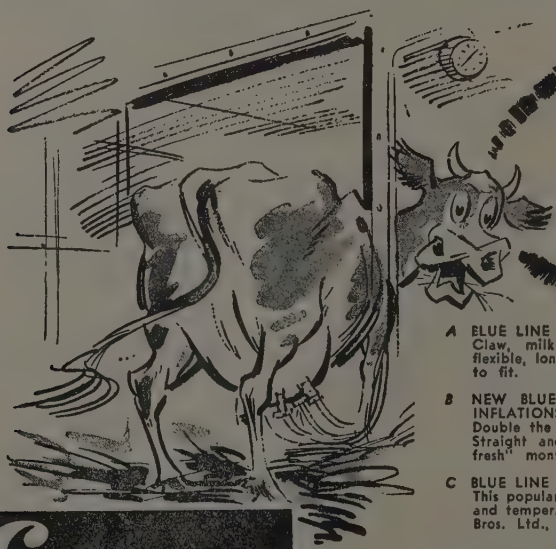

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Controlled Intermittent Mist for Plant Propagation

CONSIDERABLE attention has been drawn in many overseas publications to the use of intermittent mist in plant propagation. In this article M. G. Baumgart, Storage Specialist, Department of Agriculture, Wellington, describes the design and development of a system to suit New Zealand requirements.

THE need with various types of cuttings to control the amount of transpiration and consequent water loss has been realised for a very long time. Until the cutting has produced roots it is unable under normal conditions to draw sufficient moisture from the rooting medium to maintain turgidity throughout the cutting.

The method of reducing water loss by transpiration most commonly used in the past has been to root the cuttings under almost airtight glass frames in a heavily shaded glasshouse, so that the humidity of the air surrounding the cuttings remains very high and the air is kept stationary. This method has been reasonably satisfactory with many plants, but the special conditions are far from ideal for the plant and considerable attention by the propagator is required. Such conditions also favour the establishment and rapid development of many diseases, and cut down light, thus reducing photosynthesis and lengthening rooting time.

Frequent hand syringing of the cuttings under these frames is often necessary to reduce water losses further, and this watering is awkward and time consuming.

Several methods have been developed to provide a continuous film of water over the leaf areas of cuttings in the past without the use of special frames. The first step was to arrange nozzles in a pipeline over the propagating bed, this spray being turned on and off by hand when required. With this system considerable time and attention were still required.

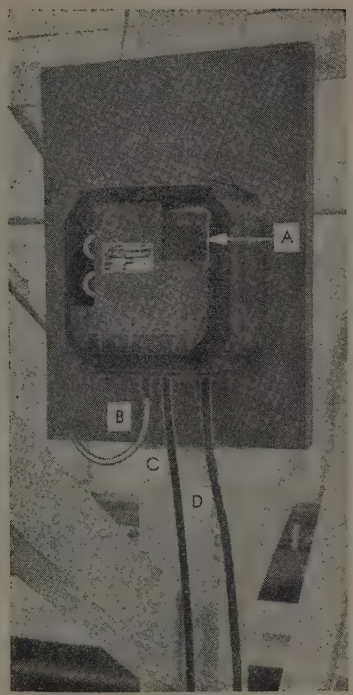
The next step was the use of very low delivery nozzles which provided a continuous spray over the beds. The water was turned on early in the morning and off at night. Even with the finest nozzles available this system tended to apply too much water to the beds under some conditions, giving a waterlogged and cold rooting medium.

The next step to overcome this trouble was to install a time control. This clock could be set to restrict the spray to any desired duration and to give as long an interval between sprays as required. The clock could also be set to turn off automatically at night and on in the morning.

None of the systems so far described provided a continuous film of water over the plant leaf automatically on demand by the plant. All were rigid systems which did not take into consideration water requirements, which varied according to the conditions.

Artificial Leaf

The development of an artificial leaf and control unit in the United Kingdom and Europe was an attempt to provide ideal conditions automatically controlled according to the plant's needs and regardless of variations in atmospheric conditions. A great deal of designing and experimental work has been done to develop satisfactory artificial leaves and control units and this work is being continued.

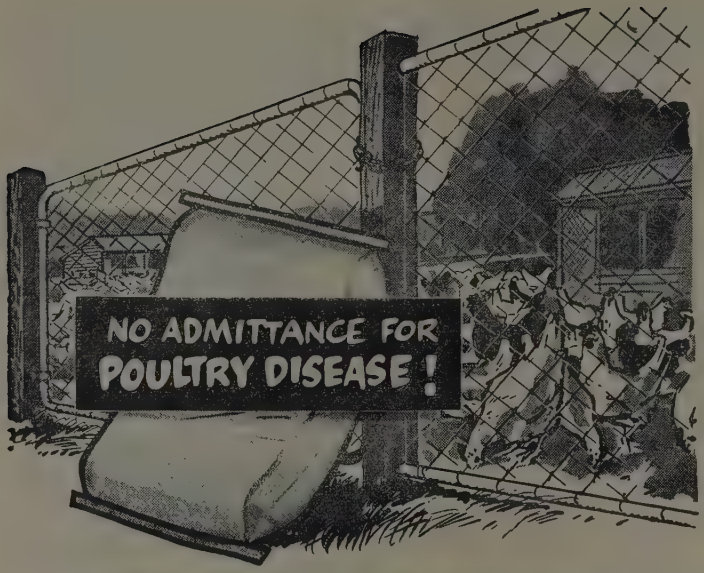


Control unit. A—Knob for adjusting relative wetness of spraying routine. B—Main connection. C—Lead to artificial leaf. D—Lead to solenoid water valve.

Spray nozzle and artificial leaf. A—Artificial leaf. B—160 degree nozzle. C—Vertical pipe standard.

The main principle is that water will evaporate from an artificial leaf at a similar rate to that from the leaves of cuttings. An electrical current is passed across the artificial leaf. The resistance to this current increases as the leaf becomes drier, and when a certain degree of dryness is reached the resistance rises to a point where it actuates an electrical valve on the water supply line and turns the spray on. As soon as the artificial leaf has received enough water to lower its electrical resistance to a set figure the whole procedure is reversed and spraying is stopped until the artificial leaf again dries and restarts the cycle.

The heart of the system is the artificial leaf. Many designs have been made and have met with varying success. The following factors have to be taken into account:



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1. Rate of evaporation from the artificial leaf should be at least as rapid as from an actual plant.

2. As it does not appear essential to provide a continuous complete film of water on the plant leaf, control solely by the break of a water film on an impervious surface does not appear wise. This indicates the need to use an absorbent paper or similar material.

3. As evaporation of moisture from the artificial leaf leaves behind the salts from the water, it is necessary to change the evaporating surface fairly regularly.

4. To reduce electrolysis it is considered necessary to use alternating rather than direct current across the leaf.

An artificial leaf has been produced which appears to fulfil all the above specifications. It consists of filter paper approximately 2 in. square supported at opposite sides by plated brass contact clamps. Evaporation can take place from both sides of the paper, which satisfactorily fulfils conditions 1 and 2 above.

The filter paper can be changed very easily. The leaf unit has alternating current across it, but this is rectified within the leaf container so that the signal returns to the control unit as direct current, thus reducing voltage losses and interaction along the line.

Main Requirements

The main requirements in the control unit appear to be:

Reliability and robustness.

Stability regardless of fluctuations in the voltage of the main electrical supply.

Variability so that different spraying routines can be given to different types of cuttings or so that as cuttings develop roots the routine can gradually be made drier to encourage further rooting.

The unit developed in New Zealand satisfies all these requirements, a potentiometer providing variations in the routine from completely dry to continuous spraying.

Propagating Bed Layout

Propagating benches vary from 3 ft. to 4 ft. wide and after considering the quantities of material which could be rooted in a bench the basic unit was taken as a bench 3 ft. 6 in. wide and 22 ft. long. This would provide space for 36 standard seedling boxes 22 in. x 14 in. x 14 in. The length of the bed can of course be varied to suit any particular conditions.

Spray Nozzles

Obtaining satisfactory spray nozzles has entailed considerable experiment. For economy a single row of nozzles must suffice. If 2 or 3 rows of nozzles are required to cover the full width of the bed, 4 or 9 times as many nozzles as for a single row are required for the whole bed. It is not necessary to have a particularly fine mist, as a fine mist will not provide even deposits over the whole bed where there are air currents.

If, however, the delivery of the nozzles is too high, the operation of the artificial leaf will be upset, water being deposited on it faster than it can be absorbed by the filter paper. This will result in short cycling of the unit, the spray being turned on and off at intervals of about 1 second.

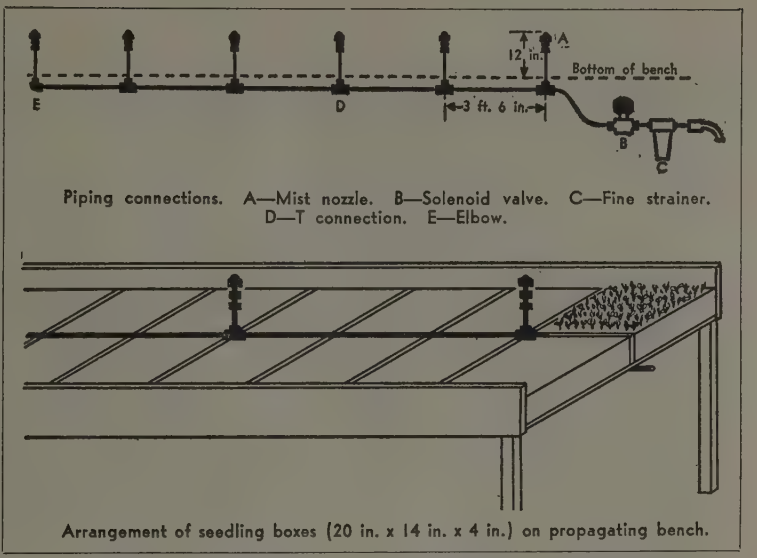
The most satisfactory delivery rate appears to be between 0.2 and 0.4 gallons per hour per square foot of bench if the nozzles are operating continuously.

The New Zealand agents for two American nozzle manufacturers have supplied, for testing, nozzles which appear very satisfactory. Both spray at a very wide angle (approximately 160 degrees), so that they can be placed upright on vertical pipes about 12 in. above the level of the bench and will cover the full width of the bench very satisfactorily. Various delivery rates are available for different bench widths. This vertical arrangement prevents any nozzle drip after the valve closes, if all nozzles are the same height.

These nozzles will operate satisfactorily with water pressures of from 25 to 100 lb. per square inch.

Other equipment required is a solenoid valve to be shut off and turned on by the control unit and a special fine-mesh strainer to prevent blocking of the nozzles. Small diameter piping should be used to prevent algal growth in the pipes.

INTERMITTENT MIST FOR PROPAGATION



Piping connections. A—Mist nozzle. B—Solenoid valve. C—Fine strainer. D—T connection. E—Elbow.

Arrangement of seedling boxes (20 in. x 14 in. x 4 in.) on propagating bench.

Little Maintenance Required

The only regular maintenance required is the changing of the filter paper on the artificial leaf and cleaning of the strainer.

The interval between filter paper changes depends on the quantity of salts in the water, but as a general recommendation the paper should be replaced every 2 weeks. The filter should be cleaned at the same time.

Evaporation from the unprotected bed lowers the temperature of the rooting medium. As best results and fastest rooting for most types of cuttings occur with soil temperatures of about 70 degrees F., it would be desirable when constructing a propagating bed to provide some form of bottom heat. As electricity is needed for the operation of the mist controller, it would probably be more economical to use electricity for heating the soil too. Approximately 5 watts per square foot would be required for a bed 22 ft. x 3 ft. 6 in. This can be supplied from an 80 ft. mains voltage soil-warming cable controlled by a thermostat.

Spectacular Increase in Output

Propagation of cuttings under intermittent mist can greatly increase output of plants from a nursery. That this increase can be quite spectacular can be seen from the following facts:

1 Cuttings root considerably faster than under normal conditions.

(Continued at bottom of page 34)

A Simple and Effective Lambing Shelter

A LAMBING shelter which can be made very easily and quickly and which will give protection from winds from any direction is illustrated here.

The shelter is made by driving five stout stakes into the ground so that when four sacks are attached firmly between the stakes the completed shelter is shaped like a W.

When the ground near a shelter becomes soiled the shelter can be shifted to a new position.

Experience on a farm near Feilding has proved that a number of such shelters will provide effective extra protection against wind for ewes and lambs at lambing time.

—*H. O. MACKLEY, Livestock Instructor, Department of Agriculture, Feilding*

Controlled Mist

(Continued from page 33)

2 A greater percentage of cuttings root.

3 As it is possible to root soft young growths satisfactorily, the propagating period can be extended for several months and far more cuttings can be taken from the stock plants.

4 It is possible to root directly plants which previously had to be propagated by other methods.

Heavy shading has previously been used on propagating houses to reduce wilting. However, as light is necessary for photosynthesis, cuttings will usually root more quickly without shading. However, if ventilation alone will not keep temperatures reasonable, light shading will have to be used.

The most satisfactory rooting medium appears to be equal parts of coarse river sand and peat. This mixture allows free draining of excess water and provides the rooting cuttings with nourishment. Pure sand or artificial media do not appear as satisfactory.

Meteorological Records for May

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	57.0	+ 0.7	73.8	42.1	6.69	16	— 0.50	2.49	17	132
Auckland	160	57.2	+ 0.6	70.3	42.9	5.15	18	+ 0.36	2.19	10	112
Tauranga	10	54.4	+ 0.8	69.0	35.1	5.77	13	+ 0.64	1.24	12	145
Ruakura	131	52.8	+ 1.4	68.2	33.3	4.78	17	+ 0.28	0.86	26	97
Whakarewarewa	1004	50.8	+ 1.6	67.8	32 ?	4.83	14	— 0.67	0.80	26	114
Gisborne	14	55.9	+ 3.0	73.2	32.2	6.23	8	+ 1.46	2.86	10	163
New Plymouth	160	54.1	+ 0.4	65.4	39.9	10.82	19	+ 4.75	1.94	26	82
Karioi	2125	46.4	+ 0.9	59 0	27.0	8.08	18	+ 4.06	1.31	5	
Napier	3	56.3	+ 3.5	72 8	35.5	4.07	8	+ 0.73	2.08	10	149
Wanganui	72	52.8	— 0.2	67.9	30.9	6.49	17	+ 3.37	1.01	9	108
Palmerston North	110	52.4	+ 1.4	67.4	30.3	5.85	20	+ 2.53	0.80	9	92
Waingawa	340	51.6	+ 2.1	68.0	32.0	6.85	19	+ 2.80	2.42	11	108
Wellington	415	51.9	+ 0.6	62.9	35.4	6.87	19	+ 2.31	2.05	12	90
Nelson airfield	5	49.4	+ 0.9	66.1	26.0	2.55	19	— 0.49	0.44	28	134
Blenheim	12	52.0	+ 2.4	71.0	26.1	2.93	11	+ 0.40	0.79	11	163
Hokitika	15	48.9	+ 0.7	62.0	29.5	17.72	21	+ 8.44	2.89	8	103
Hanmer	1270	46.8	+ 2.0	71.0	19.0	9.86	16	+ 5.38	1.73	12	104
Christchurch	22	49.5	+ 1.9	75.8	28.1	2.71	10	— 0.14	0.81	9	133
Ashburton	323	49.0	+ 2.3	76.8	21.5	1.91	13	— 0.64	0.76	9	131
Timaru	56	47.4	+ 0.6	69.3	26.0	1.20	11	— 0.33	0.33	9	136
Alexandra	520	43.4	+ 0.5	69.3	19.4	1.92	13	+ 1.01	0.46	4	98
Taieri	80	45.8	— 0.1	70.2	20.7	2.69	16	+ 0.60	0.66	8	100
Invercargill airfield	0	43.7	— 1.6	65.9	19.5	6.60	20	+ 2.86	0.95	7	101
Chatham Islands	140	50.4	— 0.2	60.8	36.2	5.54	25	+ 2.09	0.95	15	

Good Management Can Prevent Deaths of Young Pigs

EVERY pig that dies on the farm is a loss and means a lower net income to the farmer. In this article I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, suggests ways by which such losses can be avoided.

AN increase in his pig production is one means by which the dairy farmer can raise his income. An immediate and very simple way in which this can be done is to take steps to avoid those losses that occur during the progress of the pigs to their ultimate goal of pork or bacon.

It is still unfortunately true that about 30 per cent of all pigs farrowed are lost on the farm. Most of these losses occur before weaning and more than half of them between birth and 1 week old. These include pigs born dead.

Management of Sow before Farrowing

Though many people consider it is normal for there to be one or two dead pigs born in every litter, management can play a very big part in preventing this type of loss. Management of the sow while she is carrying the litter, particularly during the last month before farrowing, is important. The unborn piglets are increasing very rapidly in weight, and their demands on the sow are therefore also increasing rapidly.

A sow must not be allowed to lose condition at this time and her ration should be increased by the addition of a little good-quality food such as 1 lb. to 1½ lb. of meal a day beside dairy by-products and grazing on as good clover pasture as possible. In addition the use of a mineral mixture at this time is highly advisable.

A suitable meal mixture would be two-thirds barley meal and one-third meat meal or where it is available maize can be substituted for barley. A good mineral mixture is 40 lb. of steamed bone flour, 40 lb. of agricultural lime, and 20 lb. of salt used at the rate of a tablespoonful (1 oz.) per sow per day.

Feeding the sow on these lines for the last month before farrowing will go a long way to prevent pigs being born dead. The use of a vitamin D supplement will assist the sow to assimilate minerals. This is readily obtainable in the form of fish-liver oil.

Care at Farrowing Essential

Most losses occur at birth and during the first week of the pigs' lives, and good management again can greatly reduce the number. Firstly the sow should be put into her farrowing quarters at least 10 days before she is due to farrow so that she can become completely accustomed to them and will be contented and comfortable when she farrows. A sow that is penned up immediately before she farrows is restless and ill at ease and is most likely to kill a number of piglets when farrowing.

The farrowing house must be warm and dry, and if possible, artificial heat should be used, particularly for winter and spring farrowing. Bedding should be provided, shavings, which are fairly easy to obtain anywhere, being ideal for the purpose. They should be put down about 4 in. deep, and will not only help to keep the new-born litter warm and dry, but will prevent skin

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abrasion on the piglets through which infection can be picked up.

The sow should not be fed for 24 hours before farrowing and 24 hours afterward, but must be provided with plenty of clean water to drink.

This is important, particularly before farrowing, as a sow that consumes a large feed immediately before she farrows is almost certain to lose a number of piglets.

If the sow can be attended while she is farrowing, piglets that would otherwise be lost can be saved. However, for this to be achieved the sow must be quiet enough not to resent the presence of the attendant and her owner must be prepared to spend the time necessary with her.

Careful handling of sows, particularly when they are young, will ensure their tolerating the owner's presence at farrowing, and the saving of only one piglet worth £10 or more as a baconer should be ample compensation to the owner.

If the owner does assist a sow, he should remove the piglets as they are farrowed and place them in a box; as soon as farrowing is over they should be returned to the sow and settled on a teat.

When artificial heat can be used in the farrowing house it should be switched on at night for a day or two before the sow is due to farrow, both to get the sow used to it and to ensure that it is on when she does farrow. An electric infra-red dull emitter type of heat lamp is the best to use and the most economical. A small pilot light attached to this has some advantage, as the light appears to attract the piglets to the warm spot. If electricity is not available, a paraffin-burning infra-red lamp can be used.

The use of artificial heat where possible is of great value and will save many piglets that would otherwise be lost.

The round farrowing house has considerable advantages over any other and will undoubtedly help to avoid losses at farrowing. In any house used for farrowing sows a farrowing rail is of value and its clearance from the ground and from the wall should be at least 6 in.

The round farrowing house helps to prevent losses. To enable these piglets, eating dry meal at the self-feeder, to be photographed the creep gate was removed.

Piglets Must be Kept Warm

Having got his piglets over the very big initial hurdle of being born, the producer has next to keep them alive and to do everything possible to help them escape the various hazards that beset them.

Where artificial heat is used it should be kept on continuously for at least the first week and after that at night for a week or two according to the weather and the time of year. Cold is one of the piglet's worst enemies, but even without the aid of artificial heat it can be kept at bay by plenty of bedding and a well built house.

Scours and anaemia can cause serious losses during the first few weeks of the pigs' lives. Their prevention is not difficult provided the sow and litter can have access to good, clean paddocks of clover pasture as soon as possible after farrowing. This, of course, depends on the weather, as putting them out in wet, cold weather so that they get thoroughly chilled is useless.

If it is impossible to let a litter out because of the weather, or for any other reason, it is highly advisable to dig up a clean square of turf and put it into the pen with the sow and litter when the piglets are about 48 hours old. It is astonishing how this will disappear. The piglets appear to eat a considerable quantity of earth when they first get out, and there seems to be no doubt that they do obtain very necessary minerals from it.

If trouble is being experienced with anaemia, dosing the piglets at this

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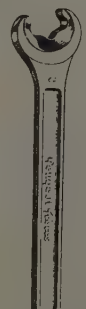

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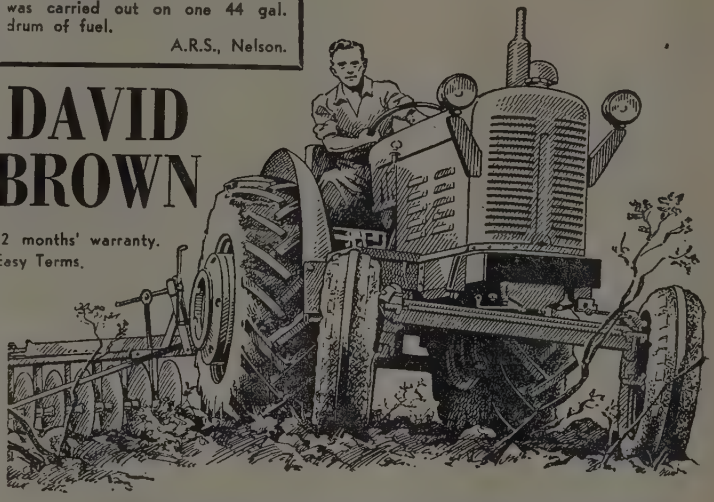

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stage either orally or by injection with an iron compound will be very effective. Several reliable compounds for this purpose are available.

Building Resistance to Disease

Swollen joints are not uncommon and though they seldom cause piglets to die, there is no doubt that they cause a check. These swellings are often caused by infection which gains access through breaks in the skin and these in turn are caused by contact with a hard floor when the piglets are suckling the sow. Deep bedding with clean shavings will largely prevent this. Infection is also sometimes picked up at birth or very shortly afterward through the navel cord before it has dried up.

Infection may also be picked up when the boar pigs in the litter are castrated. This operation, which should be carried out at about 3 weeks of age, must be done with the greatest care regarding cleanliness. A reliable antiseptic should be used and the hands of the operator, the knife, and the site of the operation on the pig washed in it **before** the operation is begun. This is most important, as an incision is to be made into clean, healthy tissue, and every care must be taken to avoid introducing infection on the hands or the knife blade or from the surface of the skin. Infection picked up at the time of castration can cause serious loss. No compensation is paid on carcasses condemned wholly or partially for what is known as faulty castration.

Half the battle in avoiding losses in pig production is won by good feeding.

Well fed pigs are healthy and healthy pigs are far more resistant to the ills that may befall them than pigs in poor condition. For the first 3 weeks of their lives the pigs depend on the sow for all their food and she must be fed so that she can produce all the milk that the piglets require.

For the first 24 hours after farrowing the sow should have no food and from then until the end of the first week her ration should be steadily increased until she is getting at least 4 gallons of skim milk a day or its equivalent in other food for her own maintenance and 2/3 gallon for each pig in the litter. A supply of clean drinking water should always be available to her. The sow should be fed at this level while suckling the litter.

However, it is impossible to lay down hard and fast rules for feeding the sow, as all sows will vary in their needs. Some will require more than the amount stated to prevent their losing too much condition; some may require less.

Creep Feeding

At 3 weeks old the litter will have outgrown the sow's milk supply and be looking round for something extra. This is the point at which creep feeding should start.

If the sleeping floor space is reduced by means of an open frame filled with bedding, weaned pigs will have a warm, dry bed to sleep in.

A creep is simply a place where the little pigs can feed and the sow cannot. In it there should be preferably a self-feeder for dry meal and a trough for skim milk. The meal can be fed in a separate trough, but this involves more work and more waste than if a self-feeder is used.

A suitable meal mixture would be 1 part of meat meal, 1 part of buttermilk powder, and 8 parts of barley meal. Feeding of dry meal should begin at 3 weeks and the feeding of skim milk at the beginning of the fifth week. Good feeding of the sow and litter, and particularly the litter, will do much to prevent untoward losses.

During weaning of the litter and a few weeks after weaning unnecessary losses are likely to occur if the management is faulty. Newly weaned pigs lose their bloom and suffer from pneumonia unless steps are taken to prevent it.

One good method is to feed a small quantity of tallow that is free from salt in the creep for about a week before the pigs are weaned. About 1 oz. a day to each pig is sufficient in the creep and when the pigs are weaned this is increased to not more than 4 oz. a day and fed at this rate for a month to 6 weeks. The reason for doing this is that the average fat content of sow's milk is about 8 per cent and when pigs are weaned and are fed on skim milk this fat content drops to 0.8 per cent, a very considerable difference.

Newly weaned pigs frequently foul their sleeping quarters and so have no dry and warm place to sleep. This can lead to trouble if steps are not taken to rectify it. The main reason for this happening is that the sleeping space provided is far too big for the pigs when they are first weaned.

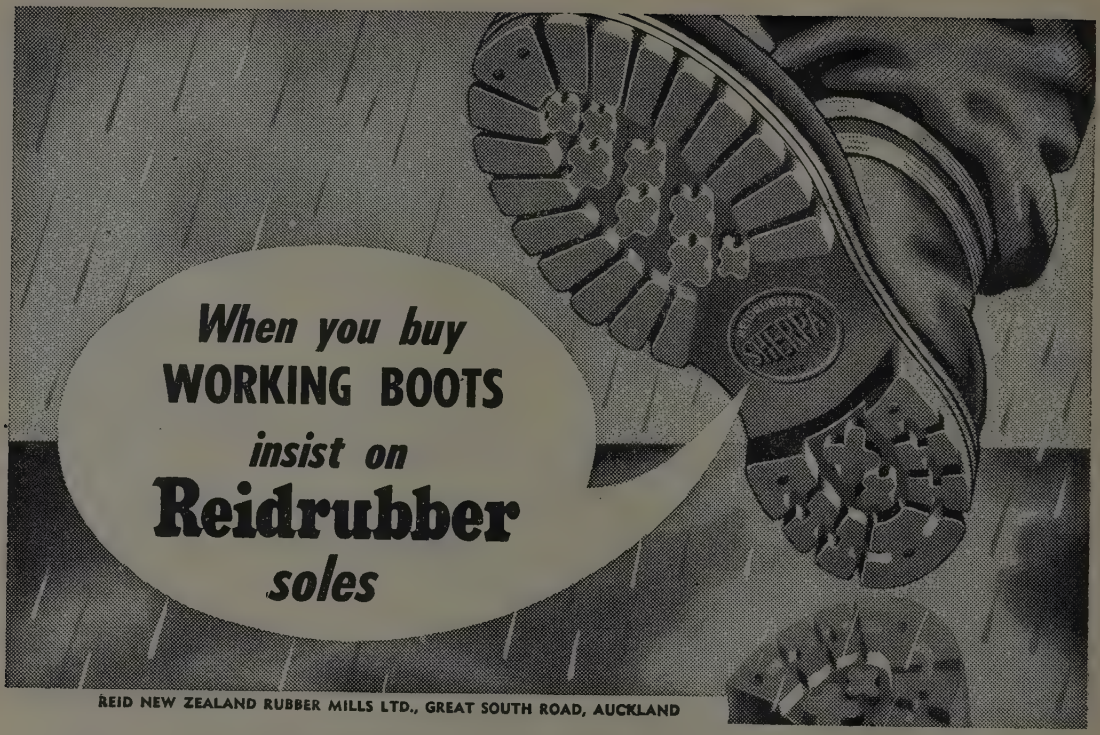
If the sleeping space is reduced by an open frame of 4 in. x 2 in. timber on edge placed in the corner of the sleeping floor and filled with shavings as bedding, the pigs will have a warm, dry place to sleep and they will keep it that way.

Several frames of different sizes can be made and a larger one provided when the pigs have outgrown the first one used. Though the pigs will still make a mess on the rest of the sleeping floor, the bedding inside the frame will remain dry.

In the larger types of house a kennel built over the restricted sleeping area to give about 4 cub. ft. of air space per pig is an added advantage; the rest of the sleeping floor is fenced off.

A run-out on good pasture, even if it is only two or three times a week, will help to keep the pigs in good health.

When pigs are approaching porker weight at 3½ to 4 months old very few losses are usually experienced as long as they have warm, dry sleeping quarters and are properly fed. The greatest risk of losses occurs in the early stages of their lives and a little extra care and attention during that period will pay good dividends in more pigs saved.



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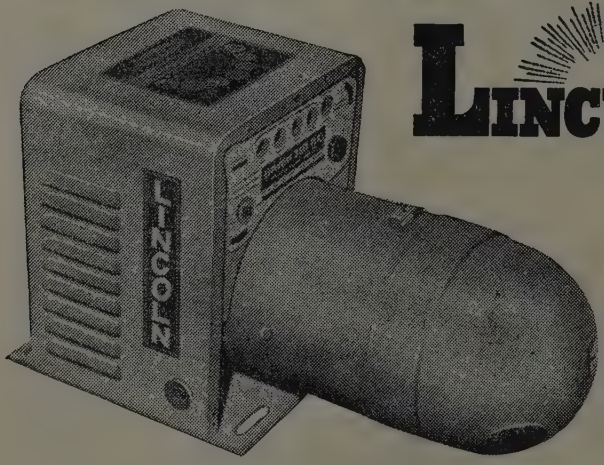

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CONTROL OF KIKUYU GRASS AND BARLEY GRASS

RECENT experimental work indicates that dalapon is much more effective for the control of kikuyu grass (*Pennisetum clandestinum*) than either TCA or sodium chlorate, which have been used in the past. Dalapon enters the plants mainly through the leaf, so that its action is not greatly influenced by soil conditions as is that of TCA and sodium chlorate. Much experimental work has also been done to find out if barley grass (*Hordeum murinum*) can be controlled by chemicals, and results of recent work in South Canterbury are given here.

KIKUYU GRASS

RATES of dalapon used in experiments have varied from 2½ to 40 lb. per acre, and results from several trials indicate that 20 lb. per acre is the most efficient when results and costs are considered. Repeat applications of lighter rates make it possible to reduce the total amount of material required per acre. For instance, three applications of 5 lb. per acre at weekly intervals gave results equal to or better than a single application of 20 lb. per acre. However, with this method it is possible that the extra cost of making three applications may be greater than the saving of 5 lb. of dalapon.

DALAPON AND AMITROL

The experiments have also shown that amitrol may be used in conjunction with dalapon to reduce costs. In one trial 10 lb. of dalapon plus 5 lb. of amitrol per acre gave results equal to 40 lb. of dalapon. This has not been borne out in subsequent trials and it seems that only under certain unknown conditions will amitrol be effective.

Dalapon is readily water soluble and should be applied as a spray in water. The amount of water required per acre does not seem very important, but it is preferable that a fine spray be used and thorough coverage obtained. Rates of 40 to 180 gallons of water per acre have been used with equally good results. As it is desirable for dalapon to be left on the leaf and not washed into the soil, it is preferable that lighter rates of 40 to 50 gallons per acre should be used. This quantity should permit a thorough coverage with a fine spray.

TIME OF APPLICATION

Though it is normally considered that weedicides which enter plants through the leaf are better applied during the period when growth is most rapid, this does not seem to apply to the use of dalapon on kikuyu grass. Experimental work indicates that autumn application gives a better kill than spring and summer application. February and April treatments have given best results and farmers have also obtained good results from May and June treatments. November, December, and July applications have given slightly reduced kills. Further work is in progress to determine the significance of these results, but in the meantime farmers are advised to use dalapon on kikuyu grass during autumn and early winter.

Because of the difficulty of obtaining complete coverage with the spray it is unlikely that a complete kill will be obtained with one application. It is therefore necessary to spot treat the odd small plants that survive the initial application. This spot treatment can be done in spring, summer, or autumn after the first application.

Dalapon, being water soluble, is likely to be washed off the plants if heavy rain falls soon after spraying. If this happens, results may be very poor, even though some of the dalapon may be absorbed through the roots. No experiments have been carried out to check how much time should elapse between spraying and rain, but it would be desirable for spraying to be followed by 24 to 48 hours of fine weather.

RESULTS

Experiments so far carried out and observations made of farmers' results clearly show that dalapon is a much more efficient killer of kikuyu grass than anything previously available and is much less expensive.

—*C. M. BLICK*

* * * *

BARLEY GRASS

THE spread of barley grass in pastures on soils of medium to high fertility has caused farmers in South Canterbury much concern during the past 2 years. Some applications of chemicals in autumn have been tried, but results have been disappointing, partly because many barley grass seeds in the ground did not germinate until late winter and partly because the chemicals did not kill all the existing plants.

CHEMICALS USED

For this reason a trial was laid down last spring on a vigorous barley grass dominant sward to see if better results could be obtained with chemicals applied at that time of the year. The chemicals tried were TCA at 10 lb. per acre, dalapon at 2½ and 5 lb., and a mixture of 2½ lb. of dalapon and 5 lb. of TCA. Immediately after treatment the area was topdressed with superphosphate at 3 cwt. per acre and oversown with perennial ryegrass and white clover. Rain did not fall for a fortnight after treatment.

Extremely good results were obtained initially with the dalapon-TCA mixture and with dalapon at 5 lb. per acre and at first it appeared that a 100 per cent kill had been obtained. However, with dalapon at 5 lb. per acre some regrowth of old plants occurred, and because of this and the new plants which established during the very wet season, the final result was only about an 80 per cent kill. Very little regrowth, if any, appeared in the area treated with the dalapon-TCA mixture and it is estimated that a 90 per cent kill was obtained. TCA at 10 lb. has given approximately a 75 per cent kill, and dalapon at 2½ lb. an estimated 30 per cent kill.

The establishment of oversown species on the trial area was only fair, as sheep on the paddock tended to concentrate on the treated area and to trample out many of the seedling plants.

RESULTS

This trial indicates that under average Canterbury conditions fairly effective control of barley grass can be obtained with a spring application of dalapon at 2½ lb. per acre and TCA at 5 lb. per acre. Though some barley grass may re-appear, a further application in the following spring could possibly result in a 100 per cent kill. Spelling of the treated area for about 2 months after treatment would also be advantageous, as it would allow a good establishment of oversown species and the development of a sward which would help to prevent further ingress of barley grass or other undesirable species.

—*J. F. SYMONS*

Footnote: Results in the North Island indicate that TCA at 15 lb. per acre has given the best results when applied in late autumn or early winter. In early trials dalapon at rates of 2 lb. per acre has given good control when applied up to the early flowering stage. Further work is required with dalapon.

Care of Livestock during August

Contributed by the Animal Research Division

CARE OF CALVING COWS

COWS about to calve should be brought into a handy paddock so that they can be kept under supervision. If a cow has difficulty in calving, veterinary assistance should be sought. This should be done as soon as it is obvious that the presentation is not normal and always within 6 hours of the beginning of labour. Unskilled interference exhausts the cow and makes the veterinarian's task more difficult or even impossible. Veterinary assistance should also be sought if the cows do not clean within 48 hours. Do not hang weights on the afterbirth.

FEEDING AFTER CALVING

Autumn-saved pasture is the best food for newly calved cows, but it must be grazed in small breaks which the cows will clean up in about 2 hours. They should continue to receive as much silage as they will eat. If the pasture is short and sappy, they should also receive hay.

CALF REARING

Calves should be fed their own mothers' milk for at least the first 2 days. This is important, as the first milk, known as colostrum or "beastings", contains substances which increase a calf's resistance to scours. Since over-feeding is an important cause of this trouble, feed not more than 6 pints daily during the first week, 7 pints during the second week, and 8 pints daily during the third week. If whole milk is fed, there is no need to give more than 7 pints per day. If scours occur, a supply of a sulpha drug should be obtained from a veterinarian immediately, as the drug is very effective when used promptly. Calves should not be kept in a calf paddock. When 2 to 3 weeks of age they should be rotationally grazed ahead of the cows. This will ensure that they always have access to good fresh pasture, which they will eat readily. Where good pasture is available calves can be weaned quite satisfactorily at 8 weeks. Further information about the good rearing of dairy stock is contained in the Department of Agriculture Bulletin No. 228, "Good Rearing of Dairy Stock".

SELECTION OF CALVES FOR REPLACEMENT

The full sisters of high-producing heifers should always be kept, as should the daughters of Merit Sires with a high progeny test. Provided they are sturdy, the calves of very old cows with good lifetime performance should always be kept, and there is no reason why the calves of well bred heifers should not be kept. The heifer twin of a bull calf should never be kept. Twin heifers may be kept with safety, if they are not too small, especially if born early in the season.

MASTITIS

Milk from each quarter should be examined with a strip cup before milking. If it shows any abnormality, or if the udder appears inflamed, treatment with penicillin should be begun at once. Three tubes of 25,000 units should be injected at 24-hour intervals, even if the milk appears normal after the first tube. Prompt treatment early in lactation will often save a quarter which otherwise might become weak or even blind.

STERILITY IN COWS

If difficulty was experienced in getting cows in calf last summer, now is the time to seek veterinary advice with a view to preventing similar trouble this year. Facilities for diagnosing infectious infertility are available at both the Wallaceville and Ruakura Animal Research Stations. Specimens must be submitted through veterinarians or Livestock Instructors of the Department of Agriculture. Effective control depends on accurate diagnosis.

LICE ON CALVES

Calves and yearlings may become very lousy during late winter and early spring. Control can be effected by the use of suitable dips, sprays, or washes. Those containing DDT, BHC, dieldrin, or aldrin are most effective. Repeated treatments may be necessary, as the eggs are difficult to destroy.

CARE OF LAMBING EWES

About 10 per cent of all lambs are either born dead or die during the first week. These losses can be reduced by careful shepherding. Many lambs and some ewes can be saved by skilled assistance during lambing. Always use a reliable lubricating antiseptic on hands and wrists. Faulty presentations must be corrected. A lamb should never be forcibly pulled away when a leg or a head is turned back. A number of lambs die from suffocation through the cleanings remaining over their nostrils; these are very easily removed. Where necessary lambs should be assisted to get a drink. This is particularly important where ewes have very large teats. Drawing away a few squirts from these will reduce their size and enable the new-born lambs to suckle. Ewes with very large teats, very small teats, badly placed teats, or defective udders should be marked for culling. A big percentage of their lambs will die. Many lambs which die during cold or wet weather would survive if they got a good drink soon after birth.

WORMS IN HORSES

Red worms reduce the efficiency of farm horses. Drenching with phenothiazine now will prevent the pastures becoming contaminated with eggs and thus reduce the chances of re-infestation in spring. As phenothiazine causes very severe reactions in some horses, dosing should be done under veterinary supervision wherever possible. If this cannot be arranged, divide the dose recommended on the package into 5 parts and give it over 5 days.

DISEASES OF CHICKS

Navel disease of chicks is contracted in the incubator, which should be scupulously cleaned and fumigated with formalin between batches of chicks. Pullorum disease can be controlled only by repeated blood testing of all stock, immediate disposal of all reactors, and thorough cleaning and disinfection of premises after each test.

RICKETS IN POULTRY

Vitamin D, known as the rickets-preventing or sunshine vitamin, is essential to young chicks for normal bone development. Chicks denied daily exposure to sunlight by intensive rearing or prolonged cloudy weather require vitamin D added to the diet, and it is advisable to use fish-liver oils containing this vitamin as a routine supplement. The amount added varies according to the potency or "strength" of the oil, for example, up to ¾ pint of an oil containing 100 units of vitamin D per gramme to 100 lb. of mash or half that quantity of an oil containing 200 units of vitamin D.

Pasture and Crop Production

Seasonal Notes by the Extension Division

ONE of the precautions that can be taken against facial eczema is the growing of crops which are safe to feed off at a time when pastures are at a dangerous stage of growth. Planning for the growing of crops should be carried out in winter. In these notes recommendations are made regarding the growing of suitable crops.

CROPS FOR FACIAL ECZEMA CONTROL

POPULAR crops grown for insurance against facial eczema are chou moellier, kale, white fleshed turnips, and rape. Of these chou moellier is the most favoured because of its ability to put out fresh growth for on and off grazing throughout dangerous periods which may extend from February to April. Insects and disease do not seriously affect yields, and this crop tolerates a wide range of climatic and soil conditions. It responds to heavy dressings of mixed fertiliser in the proportion of 4 cwt. of serpentine superphosphate to 1 cwt. of blood and bone. Cultivation should be thorough, with seeding rates from 2½ lb. per acre in 28 in. drills to 3½ lb. broadcast. As this crop takes 3½ to 4 months to mature, it will be necessary to sow in October to be ready by February.

However, unlike rape, it can be fed immature without dietetic upset should the occasion arise. For a flock of 1,000 ewes an area of 10 acres is suggested and should be break fed, especially if the crop is so insufficient that a hay supplement is required. Break feeding permits a flexible balance to be maintained between the hay ration on the restricted run-off and the amount of crop being grazed hourly, or daily. Kale is handled similarly to chou moellier and through being a crop which takes 12 months to mature, is favoured in those districts where spring feed is late. White fleshed turnips are useful, provided a long-keeping variety such as Green Globe is sown for holding over. Rape is often ruined with aphids during the long dry spell leading up to facial eczema conditions, and is stimulated into dangerous regrowth by rain at a time when it is most wanted.

—H. McM. BULL

* * *

WHEAT VARIETIES FOR NORTH ISLAND

THE main wheat-growing areas in the North Island are Rangitikei, Manawatu, Hawke's Bay, and Wairarapa. Many of the soils in these areas tend to be wet during winter, and because of this most crops are spring sown. The most suitable varieties should be quick maturing and in addition should be high-yielding, good-milling wheats with a resistance to lodging and grain loss.

Since it eclipsed Jumbuck in the late 1930s Tainui has been the main variety in most districts. It is a high yielder, matures early, and has a marked resistance to shaking, but on rich, heavy land, especially in wet and windy seasons, it lodges badly. This not only affects the growth of the wheat plants, but extreme lodging encourages stem rust and ear blight and these diseases sometimes considerably reduce yields. Lodging can be reduced to some extent by not sowing too early and by reducing or eliminating fertiliser applications, but where it is a usual occurrence it is better to grow a stiffer-strawed variety.

Gabo, a variety recently introduced from Australia where it is regarded as a premium wheat, has shown considerable promise on a wide range of soils and may ultimately replace Tainui as the standard variety when certified seed becomes available. Compared with Tainui it is higher yielding, easier to thresh, more upright, shorter in the stem, and ripens 7 to 10 days earlier. It has a marked resistance to lodging and stem rust, but undesirable features are a tendency for the ripe grain to sprout in a wet harvest and to shed a little if harvesting is delayed.

Cross 7 has not proved successful on the stiff clay soils, but is grown successfully on the free-draining soils where early preparation and sowing are possible.

—J. A. GRAHAM

* * *

POTATO VARIETIES FOR NORTH ISLAND

THE potato varieties grown commercially in North Island districts do not vary greatly from year to year. It is nevertheless important that potato growers select the most suitable variety for their locality.

PUKEKOHE

The Pukekohe district specialises in growing potatoes for the early market. The varieties grown for this purpose are Arran Chief and Ilam Hardy. Ilam Hardy generally outyields Arran Chief, but the tubers are susceptible to damage, particularly when they are dug before maturity.

RANGITIKEI AND MANAWATU

Rangitikei and Manawatu are the main potato growing districts of the North Island and they supply the bulk of the North Island market from January to April. The earliest varieties grown are Arran Banner and Ilam Hardy. Mid-season varieties are Ilam Hardy, Aucklander Short Top, and Sebago. The principal main-crop variety is Aucklander Short Top, and in the trade it commands a premium over all other varieties. Glen Ilam is a high-yielding main-crop variety, but its susceptibility to virus diseases has made it a doubtful commercial proposition.

HAWKE'S BAY

Most of the potato acreage in Hawke's Bay is on the Heretaunga Plains. Early varieties are Arran Banner and Ilam Hardy. Second earlies and mid-season varieties are Arran Banner, Ilam Hardy, Sebago, Katahdin, and Chippewa. Main-crop varieties are Aucklander Short Top, Katahdin, and Dakota.

HOROWHENUA

The Horowhenua area supplies an earlier market than most of the other southern districts. Digging starts in November and is normally completed by March. Varieties used for early crops are Ilam Hardy and Aucklander Short Top; mid-season and main crops are Arran Banner, Sebago, Glen Ilam, and Aucklander Short Top.

—A. K. BOOTH

* * *

BREAKING UP OLD PASTURE

RUN-OUT old pastures need to be broken up and sown in high-producing grasses. These can be deep ploughed in early winter, left turned up to the frost during winter, and worked and sown in late spring or early summer. Skim ploughing in autumn may be preferred, followed after some cultivation by deep ploughing during early winter. The latter method ensures firm, fine soil at the bottom of the furrow which remains in contact with the furrow slice so that moisture can move upward through the soil. Whatever method is used the important feature is the winter fallow. The weathering action of rain and frost breaks up heavy land and sweetens the soil. Subsequent working down of the furrow slices is much easier.

—T. G. SEWELL

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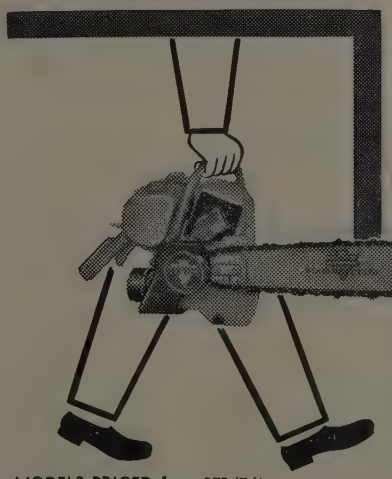

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Blue Tongue Disease of Sheep and Cattle

By C. E. ISAACS,
Veterinarian, Department of Agriculture, Invercargill

BLUE tongue, a disease of sheep and cattle that has never been reported in New Zealand, has nevertheless become important to the New Zealand farmer because it has caused a ban to be placed by the Australian authorities on the importation of New Zealand sheep and cattle into Australia, where the insect vector of the disease is known to be present.

THE disease was first described in Africa in 1880. For many years apparently it was confined to the continent of Africa, where it caused and still causes extensive economic losses and increased work for the farmer. More recently a disease called range fever in Texas, United States of America, was found to be identical with blue tongue, so the disease is either spreading or exists but has not yet been diagnosed in other countries.

Cause

Blue tongue is caused by an ultra-invisible virus; that is, an infective agent that cannot be seen no matter how much it is magnified. There seem also to be a number of strains of the virus which all cause the same symptoms but which do not immunise against one another.

The disease attacks all susceptible sheep, but Merinos are less resistant than other breeds. It is transmitted by certain insects, and outbreaks in South Africa usually occur after January and are at their worst during April and May. Contact between infected and healthy sheep does not spread the disease. The sheep must be bitten by an infected insect in the same way as a man must be bitten by an infected mosquito to get malaria.

Symptoms

When the sheep has been so infected the symptoms show up after 3 to 4 days. The first sign is a very high fever; the temperature rises rapidly to 108 to 109 degrees and remains high for about a week. During this period, of course, the affected animal will not eat, looks very mopy, and does not move around. About a week after the temperature has gone the visible symptoms appear. Sheep constantly lick their lips, which are swollen and reddish, and the tongue and cheeks are also affected; foamy saliva dribbles from the mouth owing to the constant irritation. The tongue swells and may fill the whole mouth. It becomes bluish, small haemorrhages appear on the lips, and the lining of the mouth and lips may fall off. Because of the swelling and pain of the mouth the animal does not feed and its condition rapidly declines. The infection can spread down the windpipe, causing difficult breathing, or into the stomach and intestines, giving rise to a bloody diarrhoea. The animal's feet, especially the coronets and between the claws, often become highly inflamed, and the animal will move around, if it does at all, on its knees. After this sequence of symptoms death occurs in 2 or 3 weeks.

In less acute cases, after the extreme discomfort of the mouth symptoms, the animal recovers slowly. The initial high temperature causes a severe break in the wool with resultant loss of the fleece. The animal takes months to recover from the extreme loss of condition.

In a bad outbreak in susceptible flocks up to 40 per cent of the animals may die, but the economic loss to the farmer is considerably more than this owing to drop in condition and loss of fleece of recovered sheep.

Cattle, too, can be infected by the virus and symptoms are similar. Very often the udder and teats of cows are inflamed, and because of the high fever the milk yield of dairy cows usually ceases.

Animals that recover from the disease are immune to further attacks.

Control

Before the discovery of an effective vaccine in South Africa sheep on farms where this disease occurred were moved to higher areas during the disease season. They were often moved great distances to evade the affected areas, which are usually those in which there are dams, streams, or marshes; anywhere, in fact, where mosquitoes and midges breed.

Vaccination

With the discovery of an effective vaccine the disease is being controlled in South Africa and it is now common farming practice for sheep to be inoculated annually against blue tongue. The sheep are injected under the skin, and as the immunity lasts for only 12 months, the inoculation has to be repeated every year. Though this entails a lot of extra work, the farmer knows the dire effects of an outbreak if he does not vaccinate.

Though blue tongue disease has not appeared in New Zealand, the possibility of importing a disease that would have grave consequence on the sheep raising industry is always borne in mind by Department of Agriculture officers and guarded against by an efficient quarantine service.

New Superintendent at Rukuhia

MR I. L. ELLIOTT, previously Assistant Superintendent, Department of Agriculture's Rukuhia Soil Research Station, Hamilton, has been appointed Superintendent in succession to Mr R. E. R. Grimmett, who retired earlier this year.

Born in England in 1913 Mr Elliott graduated B.Agr.Sc. at Canterbury Agricultural College, Lincoln, in 1935. The same year he joined the Department as an Instructor in Agriculture at Hastings and worked in this district and Dannevirke until 1940, when he was appointed Supervisor of Fertiliser Supplies, a position he held until 1945, when he became Assistant Superintendent at Rukuhia.

Mr Elliott has specialised in soil science, particularly plant nutrient effect on growth and methods of its measurement. He has been closely associated with outstanding soil and fertiliser research at Rukuhia, and in particular that which has led in recent years to the development for farming of large areas of peat country in the Waikato.

Mr Elliott.

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Plastic Linings for Farm Dams

By J. L. DOUTRE,
Machinery Instructor, Department of Agriculture, Auckland

PLASTIC linings made from polythene for ponds and dams have recently been used overseas, and now in New Zealand show great promise in overcoming seepage in dams in pervious soils. Polythene is an inert material, unharmed by dilute acids or alkalis, but it must be protected from sunlight, which oxidises the film, and livestock, which cause physical damage by walking on it.

ON pumice, sand, peat, and shingle it is difficult to form a reservoir without serious seepage, unless an impermeable lining is applied to seal the surface of the basin. Suitable clay for puddling in to seal the surface is often either too far away or difficult to get; even then, as the tank empties the clay dries, cracks form, and it leaks when filled again.

The polythene lining being unrolled along one side of the tank to cover 6,500 sq. ft. and to impound 150,000 gallons of water.

Concrete tanks have been constructed in many of these districts, but have failed when earth settlement caused cracks. The initial high cost reduces the size of dam that a farmer can economically build, and over the dry season it seldom contains enough water to meet his needs.

In most areas deep bores are preferable to dams, but they are usually costly and do not necessarily result in a reliable water supply. The abrasive action of pumice or sand and the acid condition of peat water also lead to higher maintenance costs on pumping equipment.

Mr P. R. Kean, whose 378-acre farm is on deep pumice in Kaharoa district north of Rotorua, tried several ways to overcome a water supply problem which he has faced for years before he used plastic lining to a dam. He has 300 ewes and a dairy herd of about 120 cows, plus about 60 heifer calves he raises each year.

The livestock require about 4,200 gallons of water per day. The water supply is from a wet weather spring at the lowest point of the farm, which is about 500 ft. above the level of Lake Rotorua. This fills a pond which during winter maintains sufficient water for the stock, but fails nearly every summer and Mr Kean is obliged to get water from his neighbour's pipeline. At times in the past he has had to haul water to his stock.

Three bores, to as deep as 450 ft., have been attempted on the farm, at a total cost of over £400, but they all failed by caving in on the drill. Mr Kean built a concrete tank holding 33,000 gallons, but has had to repair it several times because of cracks forming due to uneven earth settlement.

Mr Kean decided to try using plastic lining for a reservoir to solve his water problem, especially as the cost would be less than one-quarter that of concreting the same area. He decided on a reserve that would last him about 40 days of dry weather, a tank of 150,000 gallons capacity being required. He chose a site for the tank on the top of a hill, from which he could siphon water during summer when the normal supply had dried up. This tank has little catchment area, but the higher rainfall of the district will assist in overcoming evaporation losses.

Construction

Mr Kean obtained information on the best design and construction features for a polythene-lined tank. Gradient was important, as were levels and outflow to suit the size of tank he designed.

Though heavy rain had fallen for 2 days before the lining was put down, little water had been held in the pumice. This porous material can be worked effectively during winter wet weather.

The lining completely covers the basin and needs only to be centred and straightened and have the wrinkles pulled out. The edges are then tucked into the trench at the perimeter and covered, and pumice is then put on the material to protect it from sunlight.

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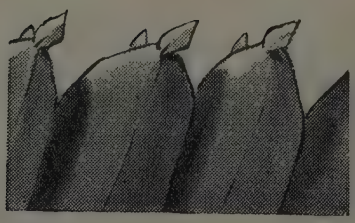

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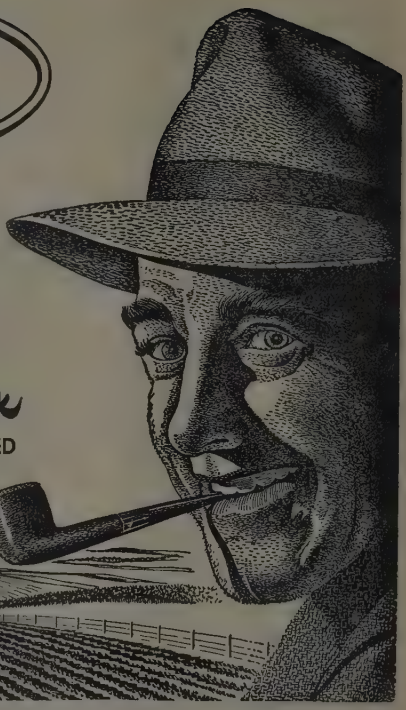

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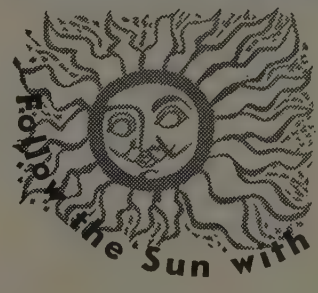

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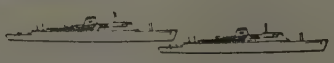

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Modern earth-moving equipment was necessary and a local bulldozer operator excavated the tank, 115 ft. long by 50 ft. wide and 6 ft. deep. The side slopes were graded to about 22 degrees or 1 : 2½, so that the pumice material to cover the plastic would not slide down to the base when the tank was filled. A flat bottom draining to the outlet end was included in the design so that the last foot of water could be got out.

As the bulldozer operator was completing the work Mr Kean used his tractor and a set of chain and tripod harrows to assist in the consolidation of the base and sides of the tank, thus reducing the chances of later settlement and rupture of the lining. The finishing and smoothing were done by hand shovel, and surfaces were then rolled with a large lawn roller to break down any hard projections and fill any hollows. The surface was raked over to remove any lumps of pumice.

Throughout the construction work Mr Kean took levels and measurements to ensure that the job went according to plan. At the end of smoothing operations a trench was excavated on level ground at the perimeter of the tank to hold the edges of the plastic, and the base for the spillway was excavated.

The tank described was excavated at the top of this hill, which provides sufficient pressure for water to be supplied to the whole farm. To start the flow an airlock at the top edge of the tank is closed and a tap just inside the fence is turned on. Water rushing down the hill in the pipeline will prime the siphon system.

Laying the Plastic Lining

The plastic lining (eight-thousandths of an inch thick) was made up by an Auckland firm, sheets of polythene 123 ft. long by 9 ft. wide being used. Six strips were centre folded and the edges double heat welded to form an accordian-like sheet 54 ft. wide. This lining, weighing 2½ cwt., was then rolled on to a drum and transported to the site, where it was taken to the hilltop on Mr Kean's tractor and unrolled along one edge of the tank.

Wind held up operations for some time, but work of laying the sheeting was able to be proceeded with in the evening. Four men took the folds of sheeting and walked backward across the tank site, dropping a pleat as the sheeting became tight. The laying was completed in about an hour. Only a slight pull was necessary to take out wrinkles and centre the sheet in position.

Protection of Lining

Gumboots were used to walk on the soft pumice and deep tracks were smoothed out. In some places where it was necessary to step on to the plastic this was done in stockinged feet or gumboots and with reasonable care no damage was done. When laying of the sheet was completed the edges were tucked into the trench at the perimeter of the dam and covered so that wind could not get beneath the sheet. Light pumice was thrown over the lining to hold it in place.

Next morning 4 in. of pumice filling was shovelled over the lining to protect it from sunlight or from being walked on at the edges.

Later a strong fence was built round the area to protect the lining from livestock, and a rabbitproof net was laid below ground level to keep rodents from burrowing into the enclosure. The concrete pipe spillway laid over the depression provided in the end wall of the tank also supports the inflow pipe and keeps it from chafing the lining. A float inlet will be provided in the tank to keep the flow from the pipe from washing the pumice material from the sides or basin.

Reticulation System

The tank is high enough to allow water to be reticulated to any part of the farm and joins into the existing system so that little additional piping had to be laid.

The pump at the bottom of the farm operates into an automatic pressure tank, so that the reservoir will be kept filled if the gate valve below the tank is not closed. When water is no longer available at the pump to fill the troughs the reservoir will be used.

A simple system of priming the pipeline has been designed. A hand pump can be fitted to a T in the line, and this pulls water from the tank into the system. If the pipe is filled, a tap turned on anywhere in the line can start the flow over the bank and down into the system. An air vent has been placed in the pipe at the highest point on the bank to stop siphoning unless the opening is closed.

Effect of Catchment Area

Under the present set-up almost all of the water that enters the tank will have to be pumped. If there had been a catchment of about 10 acres above the tank, this area would probably have kept the tank fairly full, though only part of the rainfall ran into it. On raw pumice country run-off would depend upon intensity of rainfall and traps might have had to be built to keep the tank from filling with silt. When the pumice has been grassed and consolidated more even run-off can be expected, with little problem of silting.

A much larger spillway would have had to be designed for floods after heavy showers. Evaporation would not be a serious problem as it is with the present set-up, because Mr Kean would be pumping from the tank rather than to it. Mr Kean is now considering the use of cetyl alcohol on the water surface to reduce water losses from wind and hot weather.

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The Home Garden in August

By A. G. KENNELLY,
Horticultural Instructor,
Department of Agriculture,
Dunedin

GROUND conditions, particularly where soil is heavy or moderately heavy, are rarely consistently good throughout New Zealand in August and if there is a cold, wet spell after sowing, crops may fail. Sowing should therefore be limited and, like planting, confined to the hardiest vegetables.

THE importance of continuity of supply in the production of vegetables can hardly be overstressed and because in most gardens a break in supply is most likely early in the season, when winter vegetables are exhausted and before the new season's supplies are ready, it is usually desirable that seed sowing or the setting out of young plants should be started in the new season as soon as possible. But August sowings should not be extensive, because though conditions are usually sunnier than in June or July, soil temperatures are still comparatively low and frosts may be heavy; results consequently may be disappointing.

If there is a doubt about the suitability of the soil for working up and for sowing, walking on it will give a fair indication of whether or not it is too wet. It is usually in the right moisture condition if it does not stick to the soles of the boots when it is walked on. Provided there is enough moisture, soil condition is less important for planting than for sowing. If the soil is inclined to be wet, it is better to work from a board laid on the ground than to walk on the surface when either sowing or planting.

Small sowings of most hardy vegetables can be made in well drained soils in favourably situated gardens where the ground has warmed enough. Seed of beetroot, carrots, chinese cabbages, cauliflowers, summer cabbages, kohl rabi, lettuces, leeks, turnips, radishes, peas, salsify, scorzonera, spinach, silver beet, and parsley and many other herbs can be sown. Lettuces, silver beet and perpetual or spinach beet, early cabbages, cauliflowers, and onions can be set out in most districts and should mature quickly if strong, well rooted seedlings are planted in well manured soil.

In a few districts frost-tender plants such as tomatoes, cucumbers, marrows, pumpkins, and melons can be sown under glass to be ready for setting out when frost danger is past. Though the time taken to produce good plants for planting out varies according to the treatment given, tomatoes started in warm, favourable conditions usually take about 6 to 7 weeks and the other subjects mentioned about 3 to 5 weeks to reach a suitable state for planting out.

Sowing should be governed by the facilities available and the extent of damaging frost. It is not advisable to have frost-tender plants ready too early. Such plants are usually set out from about mid-October to late October in some northern districts or to the second week in November in many southern districts.

Asparagus

In most districts August is the preferred month for setting out plants to establish a new bed of asparagus, as usually ground conditions and the plants or crowns to be set out are in the most suitable condition then. One-year-old seedlings are usually preferred, as they transplant better and establish more readily than 2-year crowns, which are considerably larger and therefore more subject to damage during transplanting. Crowns can be set out about 8 in. below soil level and the roots spread evenly over a small mound drawn up in the bottom of the trench.

The top bud should not at first be covered with more than 2 in. of soil, as a young plant is liable to be smothered and retarded if deeply covered before it has become established and sufficiently strengthened. Double rows are often planted in home gardens though commercial growers prefer single rows. Crowns should be about 18 in. apart and rows at least 42 in. apart for single rows.

Built-up or raised beds are an advantage where the soil is shallow or drainage poor. Good drainage is essential and the site on which it is intended to establish a bed should first be dug deeply. All perennial weeds should be removed. Where possible a good dressing of organic manure such as farmyard or stable manure or compost should be applied. A complete fertiliser (one containing nitrogen, phosphoric acid, and potash) is also advisable on most well worked home garden soils. It should be applied at up to about 4 oz. to 5 oz. a square yard.

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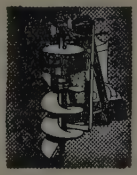

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Broad Beans

Broad beans can still be sown in districts where soil moisture is likely to be adequate up to the time of harvesting the crop, as described in last month's "Journal".

Carrots

Seed of carrots can be sown as soon as soil conditions are favourable. In most home gardens several small successional sowings are preferable to one large one. Carrots are high yielding in deep, rich, well drained, and well cultivated soils that contain adequate well rotted organic matter. Popular varieties include Red Cored Chantenay, Taranaki Strongtop, and Nantes.

Kohl Rabi

Kohl rabi belongs to the cabbage family and many people consider its flavour superior to that of cabbage, as it combines the flavours of both cabbage and turnips. It is treated as a root vegetable, though it is not a root vegetable in the sense that carrots and turnips are. Its bulbous edible "root" is an enlarged stem which forms above the ground.

Kohl rabi is a member of the cabbage family which looks like a turnip and usually does well from an early sowing.

To secure tender, succulent bulbs kohl rabi should be grown quickly. It should be used before it grows beyond about 3 in. in diameter, because if left to reach maturity, it becomes tough and stringy. It grows well in a soil that is well drained and reasonably rich in humus. Though kohl rabi is often classed with turnips, it does well under a wider variety of conditions; generally its requirements are similar to those of summer cabbage.

Kohl rabi is usually grown as a cool weather vegetable, but is very useful as a substitute for turnips during hot, dry weather, when turnips are likely to fail, though even kohl rabi should not be permitted to become too dry or it may have a bitter flavour. Kohl rabi is very hardy, but the bulbs do not keep well when stored.

Seedlings transplant well, but it is usually preferable to sow the seed ½ in. deep in rows 12 in. to 15 in. apart and later thin the plants to stand 6 in. to 8 in. apart in the rows rather than to transplant them. Plants mature in from 8 to 12 weeks from sowing.

Good varieties include White Vienna, Purple Vienna, and Short Top Green.

[*Sparrow*

A sowing of peas can be made in most districts in August if conditions are favourable.

Leeks

Leeks are one of the most reliable vegetables for autumn, winter, and spring. Though they last well in cool, moist conditions, they send up heads fairly quickly if subjected to dry, warm conditions. They are easy to grow and to ensure a long season of supply two or three sowings should be made. An early or mid-season and a late sowing will ensure a supply from autumn until late spring.

Leeks are rarely affected by insect pests or diseases. In contrast to some other vegetables, such as cabbage and cauliflower, which mature according to their season and are available or in best condition only then, leeks will stand for many months and may be used as required.

Seed may be sown from August to October in a box under glass or if the ground has warmed enough, in prepared ground outside. Seeds should be sown thinly ¼ in. deep. When the young plants are about 8 in. high, usually in December or January, they should be watered and carefully lifted and transplanted to their permanent positions.

Peas

Where the soil is well drained and the aspect is favourable peas can be sown now, even in southern districts. However, nothing is to be gained, and the crop may be disappointing if seed is sown in cold, wet ground. It is not unusual for crops sown in favourable conditions to mature before crops

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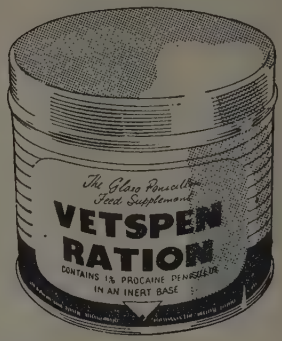

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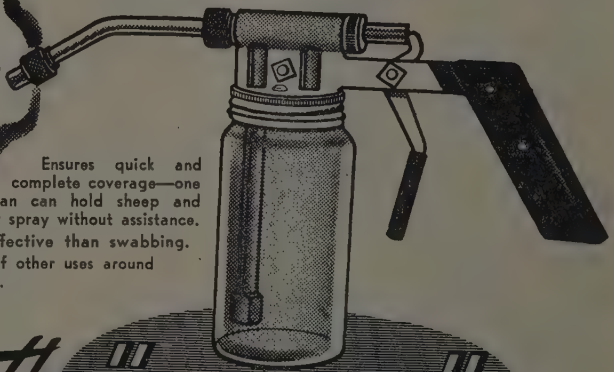

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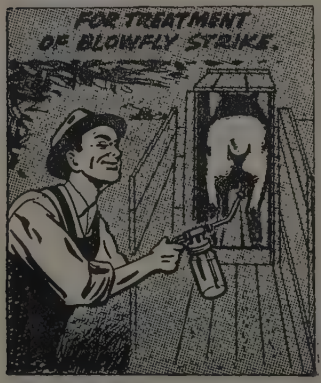

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sown several weeks earlier under unfavourable conditions.

Peas do well in cool conditions and prefer a moist, well drained soil rich in humus. They repay good cultural methods and the ground should be deeply dug and manured, preferably in autumn, with organic material such as stack bottom, compost, or farmyard manure. Dwarf varieties such as William Massey and Little Marvel can be grown without staking, but the rows should be kept earthed up. If, however, short sticks or suitable twiggy materials are available, dwarf varieties should be staked, because plants are usually better if given support.

Most varieties of peas can be harvested only for a comparatively short time. To obtain a succession it is usually advisable to make sowings at intervals of about 3 to 4 weeks of varieties having nearly similar maturity periods or to sow at about the same time several varieties each of which will mature its crop in succession.

Seed should be sown 1½ in. to 2 in. apart in V-shaped or broad, flat drills, which can be drawn out with a hoe 18 in. to 30 in. apart according to variety. Drills should be 2 in. to 3 in. deep except where conditions are hot and dry, when they should be considerably deeper so that though the seed should not be covered by more than 1½ in. to 2 in. of soil, the roots will be well down in the lower, cooler, and moister soil levels.

Potatoes

It is too early yet in most districts to make the main-crop planting of potatoes, but seed can be purchased and the tubers set to sprout in a box in a light, airy, frost-free shed or outbuilding. Well sprouted tubers planted shallowly in well drained soil in a favourable situation send shoots above ground within 2 to 3 weeks. As frost is likely in many districts until late October and in most southern districts until mid-November, the shoots of tubers planted in August are likely to be destroyed unless continuously earthed up.

Very early planting does not always result in correspondingly early maturity. If tubers planted very early are set deeply, they usually respond slowly because of the colder ground temperatures; if planted shallowly, they must be earthed up regularly to prevent frost damage. Though a severe frosting of the tops rarely kills young plants, it invariably reduces yield.

Earthing up protects the tops from frost, but normal development is impossible unless the plant is enabled to develop green leaves, with which in the presence of light it manufactures sugar, which it builds up into starches and other substances. The advantage of early planting therefore lies mainly in the development of the underground system, which, even if only moderate size, forms an excellent basis for development when frost danger is past.

The cold soil conditions engendered by frost may also make young potato plants more susceptible to the attack of the fungous disease *Corticium solani* (also known as rhizoctonia canker or black scurf), which frequently causes misses in the potato rows by attacking and destroying the young shoots as they emerge from tubers. The same fungus may also attack the bases of potato stems and cause a dry canker, which in turn may cause the stems to thicken or the upper leaves to roll slightly and in some varieties to take on a purplish tinge. Sometimes tubers form in the junction of the branches and the tubers in the soil may develop only near the surface of the soil and may be rather misshapen.

[*Sparrow*

Sowing in August should be confined to the hardiest vegetables. One of these is spinach, for which soil needs to be moist but well drained.

Protection of Tubers

If the tuber moth is likely to be troublesome, tubers set to sprout

should be dusted with DDT or lindane. Aphids may also be troublesome on the shoots of tubers set to sprout and tubers may have to be sprayed on this account with nicotine sulphate or malathion.

Because of its freedom from virus disease Government-certified seed is usually preferable. However, in districts where disease is not especially troublesome and large, good quality seed is difficult to get some home gardeners prefer to use medium or large tubers saved from a disease-free crop for early planting, because experience has shown that, other factors being equal, large tubers usually produce much stronger plants earlier than small tubers.

If the tubers are to be cut, at least two eyes should be left on each section. As control of conditions for healing is difficult for the home gardener, planting should be done immediately after cutting.

Good, well tried varieties for early planting are Epicure and Arran Banner, but there are other good varieties well suited to specific localities. Where space permits it is a good plan to test several different varieties. Early potatoes can be set 10 in. to 15 in. apart in the bottoms of trenches 4 in. to 5 in. deep and 24 in. apart.

[*Sparrow*

Though it is too early to plant potatoes in most districts in August, tubers for an early planting can be set to sprout in a sunny, frost-free situation.

Successional Sowings

If ground conditions are favourable, small successional sowings of lettuces, spinach, radishes, and spring onions may be made. These vegetables remain in the best condition for only a limited time and should be used when young and fresh. A well drained, deeply cultivated soil rich in humus is necessary, as quick, vigorous growth is essential for crisp, succulent produce. The soil for lettuce particularly should be well supplied with nitrogenous matter; dried blood, blood and bone, or poultry manure is excellent.

Seed of radishes, spring onions, and lettuces should be sown thinly ¼ in. to ½ in. deep in rows 12 in. apart. When well through the ground lettuces can be thinned to 8 in. apart. Alternatively, lettuce seed may be sown in boxes in a frame and the plants set out when 2 in. to 3 in. high.

Good varieties of lettuce for sowing now include Imperial 410, Imperial 615, and Imperial D.

Suitable varieties of onions for growing as spring onions include White Portugal and Odourless.

Most varieties of radishes are suited to early sowing where conditions are favourable.

Shallots

In the home garden shallots are mainly grown for pickling or flavouring. They are easily grown and prefer a well drained soil in a sunny situation. Culture and harvesting of shallots are similar to those for onions except that shallots are increased by offsets or cloves and can usually be set out earlier than onions.

May is often favoured for planting, though the common rule for the culture of shallots is to plant on the shortest day and to harvest on the longest. The shallot is a particularly hardy vegetable, and because it is planted as a small bulb, it is better adapted to stand rigorous conditions than plants of closely allied families which are grown from seed. However, planting on the shortest day is of little advantage if soil conditions and weather are unfavourable.

Bulbs should be graded according to size and planted 5 in. to 8 in. apart in rows 12 in. apart. Each bulb should be pressed firmly sufficiently far into the soil to keep it in position, though some growers prefer deeper planting and set bulbs to half to three-quarters of their depth. If bulbs are set deeply, the earth should be drawn away from them as they mature. Any flower heads that arise during the growing period should be removed.

Dairy Produce Graded for Export

THE following figures showing quantities of dairy produce graded for export during April 1958 and for the 9 months ended 30 April 1958 with comparative figures for the same month and the 9 months of 1956-57 have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:

BUTTER

Period	Creamery (tons)	Whey (tons)	Total (tons)	Percentage Inc. or dec.
April 1958	10,997	213	11,210	—
April 1957	8,787	228	9,015	—
Increase or decrease	+2,210	—15	+2,195	+24.348
9 months ended 30/4/58	167,031	2,727	169,758	—
9 months ended 30/4/57	147,934	2,743	150,677	—
Increase or decrease	+19,097	—16	+19,081	+12.663

Butter in store at 30 April 1958 was 32,441 tons

CHEESE

Period	White (tons)	Coloured (tons)	Total (tons)	Percentage Inc. or dec.
April 1958	5,982	1,161	7,143	—
April 1957	5,978	722	6,700	—
Increase	+4	+439	+443	+6.612
9 months ended 30/4/58	72,313	12,726	85,039	—
9 months ended 30/4/57	74,155	9,978	84,133	—
Increase or decrease	—1,842	+2,748	+906	+1.076

Cheese in store at 30 April 1958 was 23,906 tons

If these figures are converted into butterfat equivalent, there is an increase of 10.335 per cent in butterfat graded for the 9 months as compared with the preceding season. The above figures refer only to butter and cheese graded for export, and owing to diversions which may take place they are not necessarily a true indication of production trends.

Propagation of Citrus Trees

By W. A. FLETCHER,
Citriculturist,
Department of Agriculture,
Auckland

CITRUS trees in New Zealand are usually propagated by budding on to seedling rootstocks, though many Meyer lemon trees are produced from cuttings. Grafting is used only in the reworking of trees from one variety to another. As only the best trees must be grown for success in any citrus orchard, it is essential to plant only well grown, healthy nursery trees propagated from selected parent trees and using the most suitable rootstocks. If the propagation methods recommended in this two-part article are followed carefully, the best results will be ensured. This, the first part of the article, recommends seed and budwood sources and storage and describes seed extraction, preparation of the nursery seedbed, planting of the seedlings, and preparation of budwood. The second part of the article, in next month's issue of the "Journal", will describe the budding operation and later care of the bud shoots.

IT is not difficult to bud or graft citrus trees, and many growers could save expense by growing or reworking their trees themselves.

The Nursery Site

The nursery site should be as free as possible from frost, well sheltered from winds, and reasonably level for easy working and erosion control. It should also be free of noxious weeds such as oxalis, nutgrass, and couch grass.

The soil must be well drained and deep enough to permit good root development. A medium-texture soil containing enough clay to form a good ball when the trees are lifted is ideal.

Raising Rootstock Seedlings

Seedlings of Island sweet orange, rough lemon (citronelle), *Poncirus trifoliata*, and in recent years, to a more limited extent, yuzu, are the kinds commonly used for citrus rootstocks in New Zealand. Performances of these rootstocks under New Zealand conditions have been described in a previous article,* and they are only briefly discussed here.

A well sheltered, open-air citrus seedbed. Citrus seeds are commonly sown like peas in rows which are suitably spaced to allow easy cultivation.

Rootstocks and Sources of Seed

Island sweet orange seed is obtained from seedling orange trees in the Cook Islands, but it is becoming more difficult to obtain enough of it for New Zealand, as in the Cook Islands the old native seedling orange trees are being replaced by a seedless selection and another which has few seeds.

For this reason New Zealand nurserymen would be well advised to find or establish local sources of orange seed. Many widely different types of sweet orange grow in New Zealand, and as rootstocks these would probably give different reactions. Generally, however, seed from normal, vigorous, and healthy orange trees should be suitable for rootstocks.

In New Zealand sweet orange rootstock has proved satisfactory for all kinds of citrus trees and is recommended as the standard stock for propagation. Sweet orange seedlings do not grow as rapidly as rough lemon (citronelle) seedlings and often must be allowed to grow longer before budding. Also they are somewhat bushy, which makes them a little more difficult to handle in the nursery.

Rough lemon (citronelle) seed is obtained from locally grown trees, but some is also brought in from Norfolk Island.

This rootstock is losing popularity in New Zealand, and it is suitable for use only with lemons and possibly grapefruit. Oranges and mandarins should never be propagated on rough lemon rootstock, which induces decidedly inferior fruit.

Rough lemon seedlings are straight stemmed and very quick growing, which makes them very easy to handle in the nursery.

Poncirus trifoliata seed is obtained mainly from local trees. In recent years there has been a very great increase in the use of this rootstock, especially for orange, mandarin, and grapefruit varieties. It is not recommended for commercial use with lemon varieties. Because of the high demand for seed of this rootstock it has been necessary to obtain seed from New South Wales.

Seedlings of trifoliata are upright and make good nursery stocks, but they are slower growing and require careful attention to produce trees as quickly as other species.

Yuzu seed is obtained locally. Its performance in New Zealand has not been fully evaluated, but it shows promise for use with orange and mandarin trees, and its use has increased in recent years.

Extracting and Storing Seed

Seed for rootstocks should be obtained from fully ripe fruit off healthy, vigorous trees. Citrus seed quickly loses its viability if it is allowed to dry out, so where possible it is best to keep the seed in the fruits until it is sown. Fruits are often stored in barrels or other containers and allowed to rot, and then the seed can be readily obtained by washing the pulp through a coarse sieve. This method does not appear to harm the seed, and at one time practically all

* "Citrus Varieties and Rootstocks for New Zealand". "New Zealand Journal of Agriculture", vol. 95, No. 4, October 1957.

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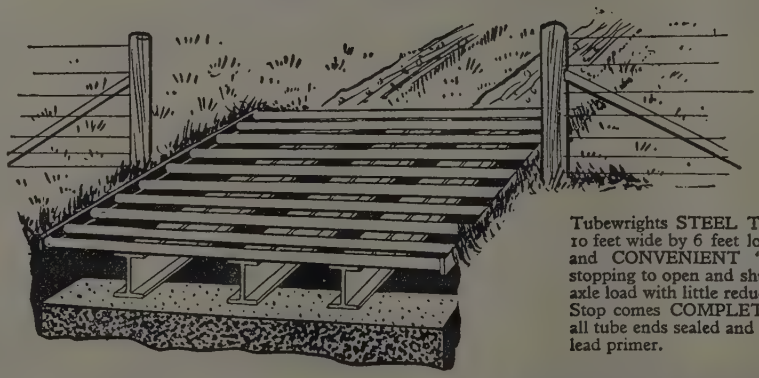

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sweet orange seed was obtained from Island oranges rejected at the markets. To remove seed from sound, fresh fruit a shallow cut should be made through the rind only to avoid injuring the seed. The halves can then be twisted apart and the seed squeezed out. Whatever the method of extraction, to avoid mould infection and reduced germination it is wise to wash the seed thoroughly and surface dry it quickly before sowing or storing it.

If seed must be stored, it should be dusted or dip treated with copper oxychloride (2 oz. to 10 gallons of water), sealed in a polythene plastic bag, and stored in a cool place, preferably in a refrigerator at about 40 to 45 degrees F. Seed so held will remain viable for several months. Whether it is stored or not, dipping or dusting with copper oxychloride before sowing is sound practice and will aid in the control of damping-off infection.

Preparing the Seedbed

Citrus seedlings may be grown more quickly in boxes under glass, but generally they are raised in well sheltered open-air beds. Sturdier plants less susceptible to diseases and pests can be raised at less cost in the open.

A sunny, sheltered position convenient for frequent inspection and with a ready supply of water should be chosen for the seedbed. A deep, fertile, well drained sandy loam is ideal, and to avoid damping-off and other diseases a virgin soil should be used.

Seedbeds should be about 3 to 4 ft. wide, which is convenient for easy weeding without trampling the bed. If only a small bed is required, it can be made by filling a timber frame with about 9 to 12 in. of soil. Raising the bed in this way will assist its drainage.

The soil of the seedbed should be dug deeply and enriched with a fertiliser rich in nitrogen and containing phosphorus and potassium several weeks before the seed is sown. A suitable fertiliser can be prepared by mixing 15 lb. of sulphate of ammonia, 10 lb. of superphosphate, and 2 lb. of muriate or sulphate of potash. This fertiliser should be applied at about 2 to 3 lb. of mixture per 100 sq. ft.

Sowing the Seed

Seed can be sown at any time during spring and summer, but it is best sown in August as soon as the danger of frost is over to obtain the benefit of as long a growing season as possible. Trifoliata seed is available in autumn and can be sown then, but it is preferable to store the seed and sow it in spring.

If the seed has been stored for some time and is dry, soaking it in water for 24 hours may improve germination and reduce the number of crooked or bench roots in the seedlings.

Immediately before sowing, the surface of the seedbed should be levelled and firmed and raked into a fine tilth. The bed can also be treated with a solution of copper oxychloride (1 lb. to 10 gallons of water) at 1½ to 2 gallons per square yard as a precaution against damping off of the newly emerged seedlings.

Seeds are often broadcast, being scattered evenly about ½ in. to 1 in. apart over the bed and covered with 1 in. of soil. More commonly they are planted like peas in rows 6 to 9 in. wide which are spaced to allow easy hand cultivation. In a small seedbed better seedlings can be expected from seeds sown in drills 3 to 6 in. apart. The seed is sown about 1 in. apart in the rows and about 1 in. deep.

Care of the Seedbed

Citrus seeds germinate in from 3 to 6 weeks, depending on their condition when planted and on soil temperature and moisture. The stems of the tender, young seedlings are especially susceptible to sun burn just as they are coming through the soil, and if precautions are not taken, losses may be severe. Careful attention to irrigation as the seeds are germinating will help to protect the seedlings, but it is perhaps wiser to cover the bed with hessian or cheesecloth during the danger period. Such a cover is also a safeguard against damage from late frosts. Slugs and snails can also cause serious harm to newly emerged seedlings and suitable poison baits should be laid to prevent this.

Once the seedlings have come up they must be given every encouragement to make strong, healthy growth. This requires keeping the bed free of weeds and frequent but not excessive watering during dry spells. Two or three liquid applications of sulphate of ammonia at ½ to 1 oz. per gallon during the growing season are also effective in maintaining vigour in the seedlings. The solution should be applied by a watering can at ½ to 1 gallon per square yard and should be followed by a sprinkling with water to reduce danger from leaf scorch.

Normally pests and diseases are not serious in the seedbed, but if present they must be promptly controlled. If the plants have damping-off infection, water them with a solution of copper oxychloride (1 lb. to 10 gallons of water) at 1½ to 2 gallons per square yard.

Citrus seedlings are ready to be transplanted to nursery rows when they are 8 to 12 in. high. Depending on management and growing conditions, seedlings may reach this size in 12 months, but more often 2 years are required, especially with trifoliata seedlings. Some nurserymen lift all their seedlings after 12 months and then after a preliminary sorting and culling grow them on in another bed for a further 12 months or more before planting them out in nursery rows.

Planting the Nursery

Before the seedlings are planted in the nursery the land should be improved by incorporating a green crop or animal manures and, if necessary, by applying about 1 ton of agricultural lime per acre. The soil should be deeply cultivated; subsoiling with a subsoil plough is desirable in some conditions.

A few weeks before planting a fertiliser rich in nitrogen and containing

▼ *Poncirus trifoliata* seedlings lined out in nursery rows and ready for budding. The hay mulch helps to conserve moisture and improve soil conditions.

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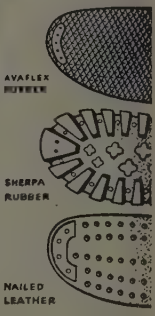

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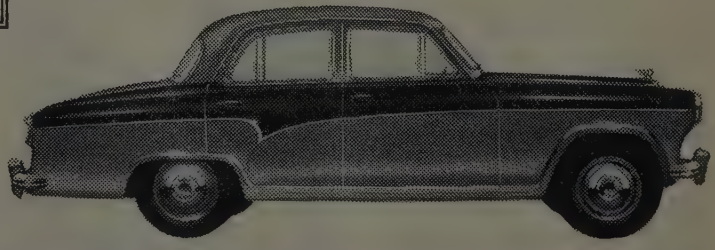

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phosphorus and potassium should be spread at about ½ ton per acre and worked into the soil, which should be left level and with a fine tilth. Further fertiliser can be applied during the growing season if necessary.

Seedlings are generally transplanted in August or September. If insufficient rain has fallen, the seedbed should be thoroughly watered the day before the seedlings are to be lifted. If the seedlings are small, the soil can be loosened with a digging fork and the plants lifted out by hand and shaken free of soil. Before larger plants are lifted it may be necessary to cut their tap roots with a sharp spade.

Citrus seedlings are best planted out as soon as possible after lifting, as they are very easily injured by drying of their roots, which should be kept damp and covered at all times. Damp sacking is suitable for this. Before the seedlings are transplanted they should be sorted into two or three grades according to size and all weak, off-type, or diseased plants and any with severely crooked or deformed main roots discarded.

The importance of this grading and culling for the production of uniform, vigorous, healthy trees cannot be too strongly emphasised. If the culling is done properly, at least 20 to 25 per cent of the seedlings will be rejected.

After the seedlings have been graded the tap roots should be trimmed to encourage fibre development and the tops cut back sufficiently to balance the loss of roots. To encourage the growth of straight-stemmed stocks which will require a minimum of trimming before budding, seedlings, especially of trifoliata, can be disbudded before planting out by removing with a sharp knife all the thorns and buds along the stem except the uppermost two or three.

Seedlings which are to be transported from the nursery should be tied in bundles for convenient handling and then packed in boxes with the roots wrapped in damp sawdust or sphagnum moss. They should be unpacked immediately on arrival and planted out or heeled in in a moist, shady place.

When seedbed stock is planted out nursery rows are usually set 3 to 4 ft. apart, according to the cultivating and spraying equipment to be used, and the trees are planted 9 to 12 in. or more apart. Wider spacing in the rows allows easier balling of the trees. If the trees are to be lifted bare rooted, closer plantings can be made.

The soil should be suitably moist at the time of planting and a damp or cloudy day should be chosen. The seedlings are planted by opening the soil with a spade, inserting them to the depth at which they grew in the seedbed, and firming the soil round the roots with the foot, a line being used as a guide to keep the rows straight. Care must be taken that roots are not bent upward as they are planted. The nursery should be set out in blocks of graded, even-sized plants. This makes budding and subsequent work easier and quicker.

Spraying to control pests and diseases in a citrus nursery. The nursery must be regularly inspected for caterpillars, aphids, scale insects, mites, thrips, and other pests and diseases and prompt attention given to control measures.

Growing the Stocks

Every encouragement must be given to the newly planted stocks to reach a buddable size as soon as possible. The nursery must be kept free of weeds to prevent competition for plant food and water. Inter-row cultivation must be shallow and may be done by a small rotary hoe, but hand hoeing close to and between the trees is necessary. Mulching with hay or straw will help to conserve moisture, but it presents a fire risk during hot, dry weather. Irrigation facilities for the nursery are most desirable.

The stocks and young budded trees should be regularly manured to promote good growth and colour. A fertiliser containing about 10 per cent nitrogen, 8 to 10 per cent phosphoric acid, and 4 to 5 per cent potash is suitable and should be broadcast over the nursery two or three times a year at up to 1 ton per acre per year. Less concentrated fertilisers containing the nutrients in similar proportions are also suitable, but should be used at heavier rates.

The nursery must be regularly inspected for all insect pests and diseases and control measures should be carried out promptly.

Citrus stocks are ready for budding when their stems have grown to about ⅜ in. diameter 6 to 9 in. above the ground. The time required to reach this size depends on the vigour of growth. Very strongly growing stocks may reach budding size late in the same season that they are set out, but usually the majority will not be ready till the following season.

Weak stocks that are too small to be budded at the same time as the majority must not be kept but must be pulled out and destroyed, as trees built on such stocks are likely to be always inferior.

Budding Nursery Stocks

Citrus seedling stocks can be grafted in the same way as many other kinds of plants, but budding is simpler, quicker, and more economical of budwood and is universally used for propagating citrus nursery trees.

Time for Budding

Budding can be done at any time during the growing season from late October to March whenever the bark will "slip" or lift easily from the wood and provided the weather is fine. Wet weather at or immediately after budding is likely to reduce the chances of success. Autumn budding has several advantages and is preferred by most nurserymen and growers. Other orchard and nursery work is at a minimum then and it is easier to obtain supplies of "unshot" buds.

Moreover stocks which are large enough to bud in early spring could have been budded in the previous autumn, as little growth is made during winter and a longer season's growth can be obtained from an autumn bud than from a spring bud, which would start growth much later.

Because of the deciduous habit of trifoliata budding of this stock cannot be left till as late in autumn as with other stocks. Spring budding is also delayed on trifoliata.

Obtaining Budwood

Much natural variation occurs in all citrus varieties and it is of the utmost importance to obtain budwood from trees with a record of good production of true-to-type fruit. Taking buds indiscriminately is likely to result in many inferior trees.

Another important aspect of citrus propagation not yet generally well understood by New Zealand growers and nurserymen is the spread of virus

disease. Several citrus virus diseases have now been identified in New Zealand. Some of these are spread by insects as well as by budding, but for others no insect vector is known and they are spread only by budding or grafting with wood from an infected tree. Scaly butt is a virus disease of the latter type which is of especial concern because it causes severe stunting of trees on trifoliata rootstock. Great care is therefore necessary when selecting buds for propagation on trifoliata to prevent the spread of this virus.

Varieties growing on any stock other than trifoliata can give no indication that they may be infected, so buds should be taken only from trees growing on trifoliata rootstock that are at least 10 years old and show no evidence of stunting or scaling of the bark on the rootstock.

Another very serious citrus virus disease is tristeza. This virus is spread by the black aphid as well as by propagation, and the only protection against it is to avoid the use of susceptible rootstocks, especially Seville or sour orange and Morton citrange.

There is no system of citrus bud certification in New Zealand, but the Department of Agriculture can assist growers and nurserymen in obtaining healthy budwood of good type.

Budwood should be chosen from well rounded, mature wood of not more than one season's growth. The wood should be about pencil thick and the buds plump and well nourished in the axils of good-sized leaves. Angular young growth is more difficult to handle as budwood and the buds may be too immature. Buds from older wood, especially that which has lost its leaves, are usually undernourished and will often not readily start to grow on the rootstocks.

To prevent injury to buds through excessive loss of moisture the leaves should be removed from the budwood with a knife or secateurs as soon as it is cut from the tree. A piece of leaf-stalk is left attached. The budsticks are kept fresh by wrapping them in damp cloth or sacking until they are required in the nursery.

Generally a normal citrus tree provides only a limited quantity of suitable budwood. Growers or nurserymen who possess their own selected trees can prepare them to provide budwood in quantity by thinning their growth in early spring to stimulate development of the remaining shoots. To obtain maximum growth manuring and pest and disease control must also be attended to.

Taking buds from blocks of nursery trees is not the best practice, but has developed owing to difficulty in obtaining enough suitable budwood of certain varieties from bearing trees. Continual propagation of a variety for several generations from one nursery block to another cannot be too strongly condemned, as a considerable number of off-type trees are likely to appear and there is considerable danger of mixing varieties. The practice can be condoned only if a small block of nursery trees is budded each year with budwood from selected bearing trees. In order to multiply this stock it is reasonable to propagate with budwood from these nursery trees for one year only.

Storing Budwood

Budwood is normally collected immediately before use, but when the budsticks have to be stored or dispatched they can be sealed in polythene bags. There is no need to add moisture to the budwood, which can be stored for several months in this way if held in a refrigerator at about 40 to 50 degrees F.

Tractor Exhaust Used to Kill Wasps

A NOVEL but very effective method of killing wasps was used by a Hastings farmer when he discovered a large wasps' nest in the bank of a deep drain; he fumigated the nest with the exhaust from his tractor.

After dark the farmer backed his tractor to a position where a hose from the exhaust could be thrust into the entrance to the nest. The engine was run for about 5 minutes. When the nest was dug out all the wasps were dead and the comb and larvae were destroyed without opposition.

With this method there is some danger from carbon monoxide fumes, but the hazard is considerably reduced by the short period of the operation. Though muffling of the exhaust for a short time would not be detrimental to the tractor, it might stop the engine as back pressure built up and make restarting difficult.

Most Effective Methods

The most effective methods of killing wasps in the ground are to pour petrol into the nest or to spread DDT in the nest entrance. The use of petrol is usually effective where the passage from the entrance to the nest slopes downward. A quart of petrol should be poured well into the opening, which should then be covered with a sack to confine the fumes. **The petrol should not be lit.**

With DDT 2 oz. of 10 per cent powder well distributed inside the opening leading to a nest will usually kill most of the flying wasps within a few hours. A complete kill should not be expected until a week or so later, as young wasps may continue to hatch from the combs for some days. A second application of DDT in 7 days is advisable to ensure a full kill. The powder can be blown into the nest through a 3 ft. length of garden hose, or a length of electric conduit piping.

A pamphlet, "Control of Wasps in New Zealand", is available free from offices of the Department of Agriculture.

—L. J. S. LINE,
Apiary Instructor,
Department of Agriculture,
Hastings

Bulletins for Orchardists and Market Gardeners

Nos.

20 Citrus Pests and Diseases in New Zealand.
81 Budding and Grafting of Fruit Trees.
101 Brown Rot of Stone Fruit.
104 Silver Leaf Disease.
135 Passionfruit Culture.
253 Harvesting and Packing the Apple and Pear Crop.
258 Raspberry Culture.
282 Currant Culture.
294 Commercial Kumara Cultivation.
297 Gooseberry Culture.
299 Establishing a Commercial Orchard.
301 Commercial Celery Culture.
306 Tree Tomato Culture.
321 Strawberry Culture.
349 Chinese Gooseberries.
358 Apricot Growing in New Zealand.
369 Commercial Growing and Storing of Pumpkins and Squash.
390 Disease and Pest Control in Gardens and Orchards.

The above bulletins, part of a series of over 350 on all aspects of farming, are available free from the nearest office of the Department of Agriculture, or from the Head Office of the Department, Box 2298, Wellington.

Asbestos Cement Hive Covers and Floor Boards

MENTION of the unsatisfactory nature of many hive covers made in the October 1956 issue of the "Journal" prompted a firm specialising in asbestos cement products to consider the manufacture of hive covers and also hive floor boards. A few of these hive parts have been given to commercial beekeepers for trial. Details of their construction and use are set out in this article by L. H. Johnson, Apiary Instructor, Department of Agriculture, Palmerston North.

An apiary with asbestos cement floor boards and covers.

THERE is no doubt that beekeepers would welcome a suitable material for hive covers and floor boards that is unaffected by water, rot, or borer, but there has been some doubt about the ability of asbestos cement to stand up to ordinary wear and tear. It may of course take years to test the suitability of asbestos cement products in this field fully, but it is expected that the cost of breakage in them will be much less than the loss through rot fungi attacking hive parts, especially floor boards.

Hive Covers

Hive covers (often called lids or roofs) are cast in one piece (5/16 in. thick). The top is not reinforced with steel, but is steam treated to increase its strength.

The hive lid design provides for ½ in. air space above the inner cover. The under surface of the outer cover is moulded with a ledge ½ in. deep and ⅞ in. wide next to the outer margins so that it rests on the outer surfaces of the inner cover only. Some of the covers have ventilating slots. Those without them appear just as satisfactory.

Inner Cover

Woven fabric mats are not recommended for inner covers, which are essential for preventing bees from gluing lids down with propolis. Inner covers cut from sheets of resin-bonded rimu plywood were tried. Some beekeepers say they are quite satisfactory; others find that the plywood tends to buckle and twist.

The material which appears to be ideal for this purpose is the 3/16 in. thick waterproof hardboard used for building. It is a comparatively recent product. The cost works out at less than 2s. a cover. A minor point is that where outer covers have been blown off by wind the hardboard inner covers, being well stuck down by the bees, remained and kept the colonies dry.

Hives with asbestos cement floor boards and covers.

Floor Boards

Floor boards (sometimes called bottom boards) are also cast in single pieces (⅝ in. thick). The floor has a slope from back to front, but the outer rim is level. It is claimed that a loading test showed floor boards to be able to carry 1,000 lb. They may be set on the ground where the surface is level and firm.

Cost of Production

No firm price appears to have been quoted during the development stage of these hive parts. The tentative ex-factory price for asbestos cement covers is competitive with that of wooden covers, but asbestos cement floor boards are dearer than wooden ones, some extra cost is involved for crates, and freight charges are higher. These extra costs can largely be saved if the beekeeper picks up the material from the factory. If the factory receives sufficient orders to justify mass

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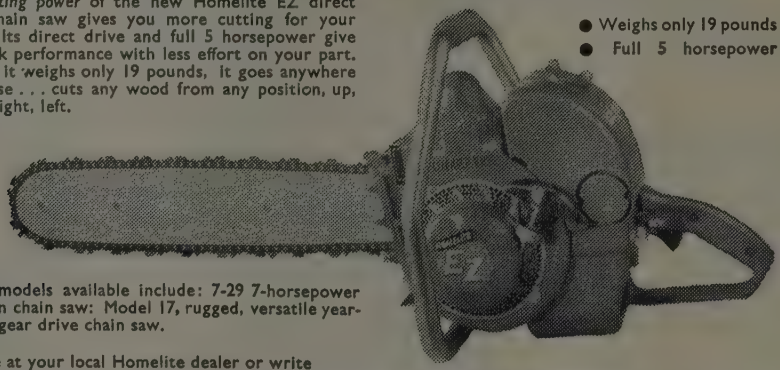

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production, the cost of parts could be reduced.

Asbestos cement covers which have been painted have a much harder surface, but in any case the material hardens with age. Painting does not make the material more durable; the only advantages are colour effects and the prevention of moss growth.

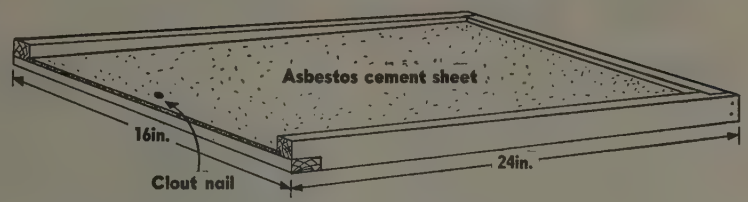
Insulation

Covers made of asbestos cement have the added value of insulating hives against heat or cold.

Users to Date

As asbestos cement hive parts are new, so far only one commercial beekeeper has ventured to purchase sufficient covers and floor boards for one apiary, which is illustrated on page 63. While this beekeeper was travelling by truck at 30 miles an hour to an apiary with a load of these asbestos cement products one cover fell off and bounced along the road. The only damage to the cover was a slightly chipped corner.

ASBESTOS CEMENT HIVE PARTS



Floor board made with timber frame and asbestos cement sheet.

Asbestos Cement Sheet in Frame

A type of floor board made from a thin (3/16 in.) sheet of asbestos cement fixed in a frame of 2 in. x 1 in. timber has been in common use for several years. Saw cuts are made on the inner faces of the timber frame (see diagram) to take the edges of the asbestos cement sheet. To assemble the unit the frame is nailed together and the asbestos cement sheet is slid in the grooves from front to back. It is then fixed in place by a clout nail in the centre front. Durable timber for the frame, like totara or heart macrocarpa, has given fair service.

The common use for floor boards of soft woods having very little natural durability, especially when placed on the ground in the optimum conditions for rot fungi, must mean heavy depreciation in these hive parts. Treating floor boards with coal tar or creosote is not recommended, because the strong odours given off under certain conditions may be absorbed by honey in the combs.

Radio Broadcasts for Farmers

RADIO broadcasts for farmers will be given during August as follows:

1YA Auckland, 7.45 p.m.

6 August—"Buttercup and Scotch Thistles", by G. B. Haddow, Instructor in Agriculture, Department of Agriculture, Auckland.

13 August—"Preparation of Short Wools for Market", by H. Mowbray, Sheep and Wool Instructor, Department of Agriculture, Auckland.

20 August—"Surface Drains", by D. F. Scott, Machinery Instructor, Department of Agriculture, Auckland.

27 August—Talk by officer of Animal Industry Division, Department of Agriculture, Auckland.

1YZ Rotorua, 7.15 p.m.

6 August—"Young Farmers' Clubs", by Eastern Bay of Plenty Y.F.C. district committee, Whakatane.

20 August—"The Need for Better Bees", by D. B. Briscoe, Apiary Instructor, Department of Agriculture, Tauranga.

1XH Hamilton, 12.33 p.m.

11 August—"Johne's Disease", by O. V. Griffiths, Veterinarian, Department of Agriculture, Hamilton.

18 August—"Spraying Fruit Trees in Spring", by W. Brandenburg, Horticultural Instructor, Department of Agriculture, Hamilton.

25 August—"A Sheepfarmer's View of the Guaranteed Price", by J. O. Bayley, Federated Farmers, Hamilton.

2XG Gisborne, 8 p.m.

12 August—Talk by J. D. Overbye, Horticultural Instructor, Department of Agriculture, Gisborne.

2XA Wanganui, 8 p.m.

7 August—"Canadian Newsletter", by Mary MacDonald.

14 August—"The Radio Vet.", by S. Jamieson, Veterinarian, Department of Agriculture, Wanganui.

21 August—"Cereal Crops for a Quick Cash Return", by A. K. Booth, Instructor in Agriculture, Department of Agriculture, Wanganui.

28 August—"Crops for the Facial Eczema Season", by A. A. Duncan, Instructor in Agriculture, Department of Agriculture, Wanganui.

2YZ Napier, 7.10 p.m.

12 August—"Farm Management", by G. M. Bennett, Instructor in Agriculture, Department of Agriculture, Hastings.

26 August—"Feed Flavours", by L. W. Scott, Farm Dairy Instructor, Department of Agriculture, Hastings.

3YA Christchurch, 12.20 p.m.

4 August—"Further Notes on Stock Diseases", by A. C. Howse, Veterinarian, Department of Agriculture, Christchurch.

18 August—"Review of 'The New Zealand Journal of Agriculture'", by E. G. Smith, Instructor in Agriculture, Department of Agriculture, Rangiora.

4YA Dunedin and 4YZ Invercargill, 12.33 p.m.

4 August—"Bees are Important", by D. W. Seal, Apiary Instructor, Department of Agriculture, Invercargill.

11 August—"Orchard Spring Management", by S. Kemp, Horticultural Instructor, Department of Agriculture, Alexandra.

18 August—"Spring Preparatory Work", by W. Faithful, Instructor in Agriculture, Department of Agriculture, Invercargill.

25 August—"Weed Control Experiments", by J. G. Richards, Instructor in Agriculture, Department of Agriculture, Oamaru.

Regular Sessions

1XH Hamilton, Mondays at 12.33 p.m. and Tuesdays at 8 p.m. (Frankton stock market report), Wednesdays at 12.33 p.m. (report from Ruakura Animal Research Station), Thursdays at 12.33 p.m., Fridays at 8 p.m. (stock sale review).

1XN Whangarei, Mondays at 8 p.m. (Northland livestock report and "Farming for Profit"), Wednesdays at 8 p.m. ("Farming for Profit"), and Fridays at 8 p.m. ("News for the Farmer").

1YA Auckland, Mondays at 12.33 p.m., Tuesdays, Wednesdays, and Thursdays at 7.45 p.m., and Fridays at 6 p.m. and 7.45 p.m.

1YZ Rotorua, Mondays at 12.33 p.m. (Waikato stock market review), Tuesdays at 7 p.m. (Hamilton stock market report), Wednesdays at 7.15 p.m. (Pig Council talk on fourth Wednesday of every other month at 12.33 p.m.), Thursdays at 12.33 p.m.

2XA Wanganui, Wednesdays at 8 p.m. (Wanganui stock sale report), Thursdays at 8 p.m.

2XG Gisborne, Tuesdays at 8 p.m., Fridays at 8.2 p.m. (Gisborne stock market report).

2XN Nelson, Thursdays at 8 p.m.

2XP New Plymouth, Thursdays at 8.1 p.m.

2YA Wellington, Mondays at 7.15 p.m., Thursdays at 12.33 p.m., Fridays at 7 p.m. (Feilding stock market report).

2YZ Napier, Tuesdays at 12.12 p.m. (Hawke's Bay orchardist session), Tuesdays at 7.10 p.m., Wednesdays at 7.15 p.m. (Hawke's Bay-Poverty Bay livestock market report), Thursdays at 12.33 p.m.

2ZA Palmerston North, Mondays at 12.33 p.m., Fridays at 8.45 p.m. (Feilding stock market report).

3XC Timaru, Mondays at 8 p.m. (Pleasant Point stock market report), Tuesdays (fortnightly) at 8 p.m. (Temuka stock market report), Wednesdays at 8 p.m., and Saturdays at 10.30 a.m.

3YA Christchurch, Mondays at 12.20 p.m., Wednesdays at 7.15 p.m. (Addington stock market report), Thursdays at 12.33 p.m. and 7.15 p.m.

3YZ Greymouth, Mondays and Thursdays at 12.33 p.m.

4YA Dunedin, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m., Wednesdays at 12.33 p.m. and 6.50 p.m. (Burnside stock market report), Thursdays at 12.33 p.m.

4YZ Invercargill, Mondays at 12.33 p.m., Tuesdays at 12.33 p.m. and 7.15 p.m. (Lorneville and Gore stock market reports), Wednesdays at 12.33 p.m., and Thursdays at 12.33 p.m.

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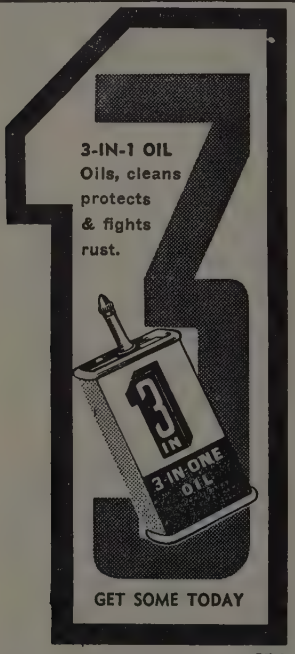

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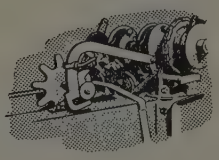

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Lamb Growth on Magnesium-topdressed Pastures

No Improvement in Southland Trials

By L. I. HART,
Scientific Officer, Department of Agriculture Animal Research Station, Wallaceville

THAT magnesium topdressing improved the growth of lambs on certain farms in Southland was suggested as a result of observations described in the "New Zealand Fertiliser Journal" for July 1956. Though these observations were not fully controlled in the experimental sense, they seemed of sufficient interest to warrant further investigation. This article describes experiments with two different methods of magnesium application on two Southland farms during the spring and summer of 1956. These trials failed to show that magnesium topdressing improved lamb growth.

TRIAL 1

THE first trial was carried out on one of the properties where previous observations had suggested an association between better growth of lambs and magnesium topdressing.

The farm is at Waimumu, near Gore, on a soil type classified as Waimumu set coastal yellow-grey earth, terrace type. For the purpose of the trial, 5 paddocks with areas ranging from 7½ to 20 acres, which had been given varying fertiliser treatments, were available. Paddocks were each stocked at about the same rate of about 5½ ewes and between 6 and 7 lambs per acre. On 10 October 50 lambs were selected at random from each paddock, ear-tagged for individual identification, and weighed. Further weighings were made on 6 December 1956 and 3 January 1957. On the last date all the lambs from the trial paddocks were weaned and the trial ended. Fertiliser treatments and average total weight gains for the trial lamb groups on each paddock are shown in Table 1.

TABLE 1

Paddock number	Area	Fertiliser treatment	Average lamb weights on 10/10/56	6/12/56	3/1/57	Average total weight gains
	acres		lb.	lb.	lb.	lb.
1	15	2 cwt. per acre (44/46) superphosphate, March 1956	29.1	59.5	63.4	34.3
2	15	2 cwt. per acre cobaltised potassic magnesium superphosphate, March 1956	31.0	61.5	67.8	36.8
3	7½	2 cwt. per acre cobaltised potassic magnesium superphosphate, March 1956	33.5	64.0	70.5	37.0
4	15	2 cwt. per acre cobaltised potassic magnesium superphosphate, March 1956 + 2 cwt. per acre magnesium serpentine superphosphate, August 1956	34.5	60.8	66.7	32.2
5	20	2 cwt. per acre cobaltised potassic magnesium superphosphate, March 1956 + 5 oz. per acre cobalt sulphate, October 1956	32.7	64.0	72.8	40.1

TABLE 2

Paddock treatment	Average lamb weights on 4/12/56	5/1/57	Average total weight gains
	lb.	lb.	lb.
Untreated	58.5	71.7	13.2
Magnesium sprayed	57.1	69.6	12.5

TRIAL 2

The second trial was carried out on a farm at Woodlands, near Invercargill, The soil type of this farm is classified as Waikiwi lowland yellow-brown earth. In October 1956 the farmer concerned began a trial in which a 10-acre paddock was divided into two equal areas one of which was left untreated and the other sprayed with a solution to give 30 lb. of magnesium sulphate to the acre. The average weight gains made by lambs in untreated and magnesium-treated areas were compared.

On 4 December when all lambs in each half were first weighed it was found that the treated half carried 51 lambs and the untreated half 44 lambs. All lambs were weighed again at weaning on 5 January 1957 and the trial ended. Results are shown in Table 2.

No Advantage

There is no evidence from Trial 1 that magnesium improved the growth of the lambs; in fact, the lambs which made the least gain were from Paddock 4, which was topdressed twice with magnesium, in March and again in August. The better gain made by the Paddock 5 lambs calls for some comment. It is known that on mildly cobalt-deficient land in Southland the growth of lambs may be limited from about December onward. For this reason it is better to apply cobalt in spring, as was done in Paddock 5, than in the previous autumn. The better growth of the lambs in Paddock 5 could have been due to the October application of cobalt to this paddock.

Results from Trial 2 are of more limited value because of the higher stocking rate in the magnesium-treated paddock. However, under the conditions of the experiment there is no indication that magnesium had any effect on the weight gains of lambs.

There is no evidence from these trials that magnesium improves the growth-rate of lambs in Southland.

Acknowledgment

The writer is indebted to Messrs S. C. Bowmar, Waimumu, Gore, and A. I. Grant, Woodlands, Invercargill, who provided facilities for the trials. The assistance of Mr R. W. Bush, Field Officer, Fertilisers (South Island, N.Z.) Limited, Invercargill, and of R. G. Buchan, Livestock Instructor, Department of Agriculture, Gore, is also gratefully acknowledged.

Puddings for Hot or Cold Days

A fruit whip and a black currant tart.

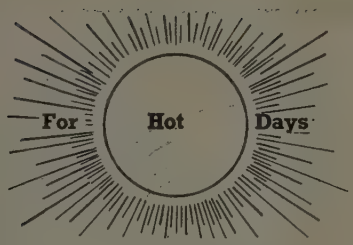
THE puddings for which recipes are given in this article by Betty M. Johnston, Home Science Instructor, Department of Agriculture, Wellington, have been chosen because they are easy to make and because their simple flavours should appeal to all members of the family. They are the answer to the housewife's oft-recurring problem, "What shall I make for pudding?" Many of the cold puddings may be made in advance and stored in a refrigerator or a cool safe until they are needed, an added factor which should commend them to a busy homemaker.

ADULTS may find that biscuits and cheese or a dessert of fresh, raw fruit make a satisfying final course for dinner, but often these are not sufficient to meet the nutritional requirements of active, growing children, and of men who are engaged in hard physical work. Many families, too, prefer to round off dinner with a pudding.

The puddings below have been chosen to cover all seasons of the year; some of the cold ones are ideal for mid summer while the more solid pies and baked puddings are designed to meet the sharpened appetites of winter.

Standard measures are used in all these recipes. The graduated spoons are made of either metal or plastic, and a standard measuring cup has a capacity of 8 fl. oz. All the measurements are level ones, and flour is sifted before measuring or weighing.

In the gelatine recipes unsweetened evaporated milk may be substituted for all or part of the cream. Use ¾ of a cup of chilled unsweetened evaporated milk in place of 1 cup of cream. Always soak the gelatine in cold water or liquid until it is swollen and soft before adding it to hot liquid. For Bavarian creams and fruit fool chill the fruit jelly base until it is just beginning to set before folding it into the whipped cream. If the jelly is too stiff, it will not blend properly and a poor volume will result. If it is too thin, the mixture will separate into two layers. This is often seen in Spanish cream, which should have an even, spongy texture throughout.



Fruit Whip

1 tablespoon of gelatine
1 cup of fruit juice
½ cup of sugar (use half this quantity if bottled or tinned fruit is used)
1 tablespoon of lemon juice
½ cup of fruit pulp or 4 oz. of dried fruit
2 egg whites
½ cup of cold water

If dried fruit is used, soak it in warm water for 24 hours before pulping it through a sieve or food mill. Soak the gelatine in the cold water. Add the fruit juice (hot) and half the sugar; stir until it is dissolved. Add the lemon juice. Allow the liquid to cool and when it is beginning to set add the fruit pulp or softened and pulped dried fruit. Beat the mixture until it is frothy. Beat the egg whites to a foam, add the remaining sugar, and continue beating until a thoroughly stiff foam is obtained. Fold the beaten eggs and sugar into the gelatine-fruit mixture. Pile the fruit whip into serving dishes or pour it into cold, wet moulds. Serve cream or a custard made with the egg yolks with the whip. Sliced or chopped raw fruit, whipped cream, or toasted coconut may be used to "dress up" the pudding.

To toast coconut: Place dried coconut in a cake tin or baking dish and bake it in a moderately hot oven (350 to 375 degrees F.) for a few minutes. Shake the dish once or twice while the coconut is being toasted.

Any fruit may be used for fruit whip; left-over fruit juice with a little fruit pulp can be made into a whip and piled on shallow meringues.

Fruit Fool

2 egg yolks
½ teaspoon of salt
2 tablespoons of cornflour
¼ teaspoon of vanilla essence
1 cup of drained fruit pulp
1 cup of scalded milk
1½ oz. of sugar
2 egg whites
1½ oz. of sugar

Make a custard sauce by beating together the 2 egg yolks, salt, and cornflour. Add the vanilla and gradually add 1 cup of scalded milk. Cook the mixture over boiling water until it has thickened; then stir in 1½ oz. of sugar. Cool the custard. Beat the egg whites until they are foamy and add the second 1½ oz. of sugar. Fold the egg whites into the cool custard and add 1 cup of well drained fruit pulp. Half a cup of whipped cream may be added after the egg whites have been folded into the custard.

Red Plum Mousse

Any cooked fruit may be substituted for red plums.

1 cup of drained red plums
½ cup of sugar
1 tablespoon of cold water
1 teaspoon of gelatine
2 tablespoons of lemon juice
1 cup of cream

Sieve the fruit and beat the pulp with the sugar. Soak the gelatine in the cold water for 5 minutes. Combine the fruit pulp, lemon juice, and gelatine. Chill the mixture and when it is beginning to set fold it into the whipped cream. Pour the mousse into a cold, wet mould and freeze it in a refrigerator.

Chocolate Mousse

½ cup of boiling water
½ cup of cocoa
1 tablespoon of gelatine
1 cup of sugar (less if desired)
1 cup of cream (whipped)
1½ cups of unsweetened evaporated milk (chilled)
1 teaspoon of vanilla
¼ cup of cold water

Mix the cocoa to a smooth paste with a little of the sugar and cream. Blend it in a saucepan with the boiling water and cook it gently for 10 minutes. Soak the gelatine in the cold water, add the cocoa mixture, and then add the sugar and vanilla. Cool. Fold the mixture into the whipped cream and whipped evaporated milk. Pour the mousse into refrigerator trays and freeze it.

Fruit Bavarian Cream

2 tablespoons of gelatine
½ cup of cold water
2 cups of fruit pulp
1 cup of sugar
4 tablespoons of lemon juice
2 cups of cream (whipped)

Soak the gelatine in the cold water for 5 minutes and then mix it with the heated fruit pulp and sugar until all the granules have dissolved. Add the lemon juice to the fruit mixture and chill it. When it is beginning to set fold the mixture into the whipped cream.

Packaged pudding mixes can save precious minutes, which may justify the higher cost compared with that of puddings completely made at home.

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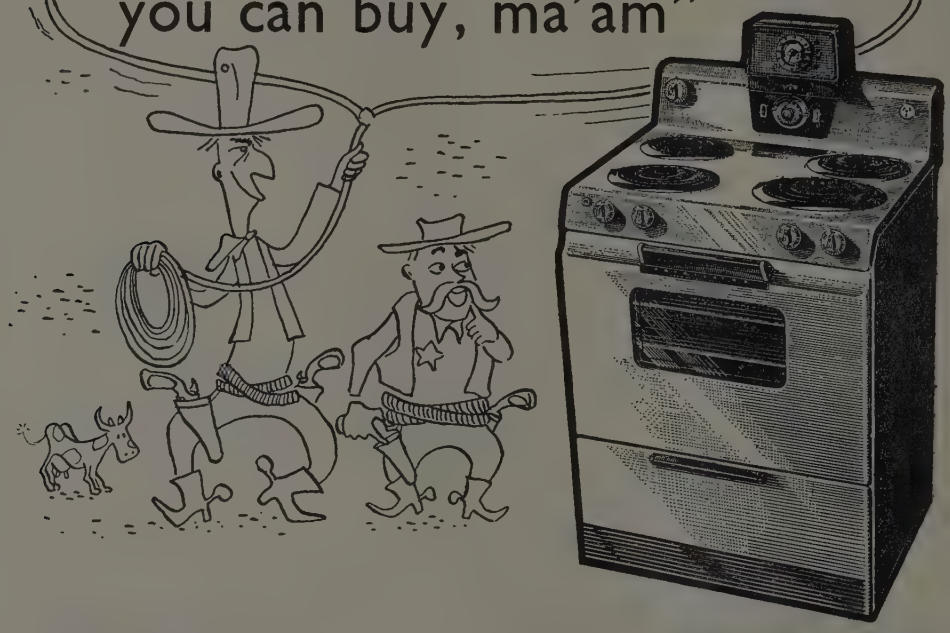

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Coffee Bavarian Cream

1 tablespoon of gelatine
¼ cup of strong black coffee
2 egg yolks
¾ cup of sugar
½ teaspoon of salt
¾ cup of milk
1½ cups of cream (whipped)

Soak the gelatine in the coffee. Black coffee essence may be made quickly by dissolving ½ teaspoon of soluble coffee powder in 2 oz. of boiling water. Cool it before mixing it with the gelatine. Warm the milk in the top of a double boiler and dissolve the sugar and salt in it. Beat the egg yolks until they are creamy and gradually mix them with the warm milk. Cook the custard slowly, stirring it frequently, until it coats a wooden spoon (about 10 to 15 minutes). Add the softened gelatine and strain the mixture. Chill it, stirring occasionally until the mixture begins to thicken. Fold it into the whipped cream. Pour it into a cold, wet mould and leave it to set or pile it on top of scooped-out meringue nests. Decorate Bavarian cream for special occasions with whipped cream, toasted coconut, or sliced fruit, for example, Chinese gooseberries or orange sections.

Fruit Juice Souffle

1½ tablespoons of gelatine
¼ cup of cold water
2 oz. to 3 oz. of sugar
1 cup of citrus juice
¾ cup of boiling water or left-over fruit juice
2 egg whites
1 cup of whipped cream

Soak the gelatine in the cold water for a few minutes and then stir it into the boiling water or juice. Dissolve the sugar in the hot liquid. Add the citrus juice and allow the mixture to cool. When it is beginning to set fold in the stiffly beaten egg whites and whipped cream. A packet of jelly crystals can be substituted for the gelatine and sugar and made up in the usual way.

Melrose Cream

2 egg yolks
2 tablespoons of sugar
2 egg whites (whipped)
½ pint of milk
1 packet of red jelly made with half the usual quantity of water

Make a custard with the egg yolks, sugar, and milk. Make the jelly as directed on the packet, remembering to use less water. When the custard is cold and the jelly is beginning to set, mix the two and beat them together. Fold the mixture into the whipped egg whites. Chill the pudding.

Two tins of unsweetened evaporated milk may be substituted for the custard and egg whites. First chill the milk and then whip it. Fold it into the congealing jelly. Chill the pudding.

Spanish Cream

1½ tablespoons of gelatine
4 oz. of cold milk
3 egg yolks
4 oz. of sugar
Pinch of salt
12 oz. of scalded milk
1 teaspoon of vanilla
3 egg whites

Soak the gelatine in the cold milk for a few minutes. Beat the egg yolks, sugar, and salt together until they appear creamy and light in texture. Stir in the scalded milk and cook the custard in a double boiler, stirring it constantly, until it will coat a wooden spoon. Allow the custard to cool for 10 to 15 minutes and add the soaked gelatine, stirring the mixture until all the gelatine has dissolved. Stand the custard in a cool place, stirring it occasionally. When it begins to thicken fold in the stiffly beaten egg whites and vanilla. Turn the cream into a cold, wet mould. The texture of Spanish cream should be the same throughout; separate layers of clear jelly and sponge result from adding the egg white before the custard is sufficiently set.

Lemon Souffle

6 oz. of lemon juice
2 tablespoons of sugar
4 egg yolks
8 oz. of sugar
½ teaspoon of salt
4 stiffly beaten egg whites

Butter an ovenware dish and heat the oven to 350 degrees F. (moderate heat).

Beat the lemon juice, egg yolks, and 2 tablespoons of sugar together until a light, smooth cream forms. Gradually beat in the remainder of the sugar and the salt. Fold the cream into the egg whites and pour the mixture into the greased baking dish. Cook the souffle at 350 degrees F. for 15 minutes and then serve it immediately.

Lemon Meringue

2 cups of cold water
5 tablespoons of cornflour
Juice and rind of 2 medium-sized lemons
1 oz. of butter
8 oz. of sugar
4 well beaten egg yolks
½ teaspoon of salt
4 tablespoons of sugar
4 egg whites

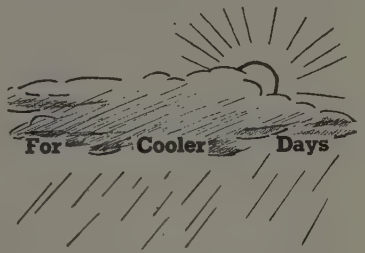
Mix the cornflour, 8 oz. of sugar, and salt in the top of a double boiler. Add the water, mixing the ingredients to a smooth paste. Heat the mixture quickly to boiling point, stirring it constantly, as otherwise lumps will form. When the mixture looks shiny and clear pour it slowly into the beaten egg yolks. Return the mixture to the double boiler and simmer it until it thickens (about 10 to 15 minutes), stirring it frequently. Add the butter and the lemon rind.

Heat the oven to 375 degrees F. (moderate heat). Pour the mixture into a baked 9 in. pie shell or an ovenware dish. Whip the egg whites to a foam and add the remaining sugar 1 tablespoon at a time, beating the egg whites well between each addition. When the meringue mixture is stiff pile it on top of the pudding and bake it for 10 minutes at 375 degrees F. (moderate heat). A 9 in. lemon meringue pie serves 5 or 6 people.

Hawaiian pie is a variation of this recipe; 2 oz. of dried coconut and 1 tin of drained, crushed pineapple is added to the mixture. It may be necessary to increase the cornflour slightly, depending on the amount of pineapple added.

Pudding Mixes

Many grocers have packaged mixes which can be very useful in emergencies. Most of them require additional milk and sometimes an egg, so the nutritional value of these puddings is quite high. They are usually slightly more expensive than similar puddings completely made at home, but there are times when the convenience of having the preliminary mixing done justifies a slightly greater cost.



Java Cream

2 tablespoons of sago
2 tablespoons of sugar
Pinch of salt
1 pint of milk
1 egg yolk
1 egg white
1 oz. of dried coconut

Heat the sago, milk, sugar, and salt in a double boiler until the sago thickens. Stir occasionally. While the sago is cooking whisk the egg yolk until it is creamy, beat the egg white until it is stiff, lightly grease an ovenware dish, and preheat the oven to 350 degrees F. (moderate heat). When the sago is ready pour it into the egg yolk, and when they are thoroughly mixed fold in the egg white. Pour the pudding into the ovenware dish and bake it for 15 to 20 minutes.

Cream Pies

1 pint of milk
1 oz. of cornflour
½ teaspoon of salt
3 oz. of sugar
2 to 4 egg yolks and whites
1 teaspoon of vanilla, almond, or lemon essence
½ oz. of sugar for every egg white used in the meringue topping

Heat the milk and add the cornflour mixed to a paste with cold milk. Add the salt and 3 oz. of sugar. Cook for 5 minutes over direct heat, stirring continually. Mix in the beaten egg yolks and continue cooking over hot water (use either a double boiler or place the saucepan in a larger pan of hot water). Remove from the heat and add the flavouring. Either fold the stiffly beaten egg whites and extra sugar into the slightly cooled mixture or pour the cream filling into a pie shell and make a meringue topping with the egg whites and sugar.

Bake the pie for 10 minutes in an oven heated to 375 degrees F. (moderate heat).

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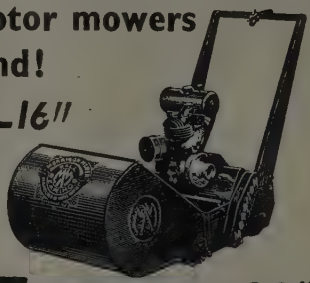

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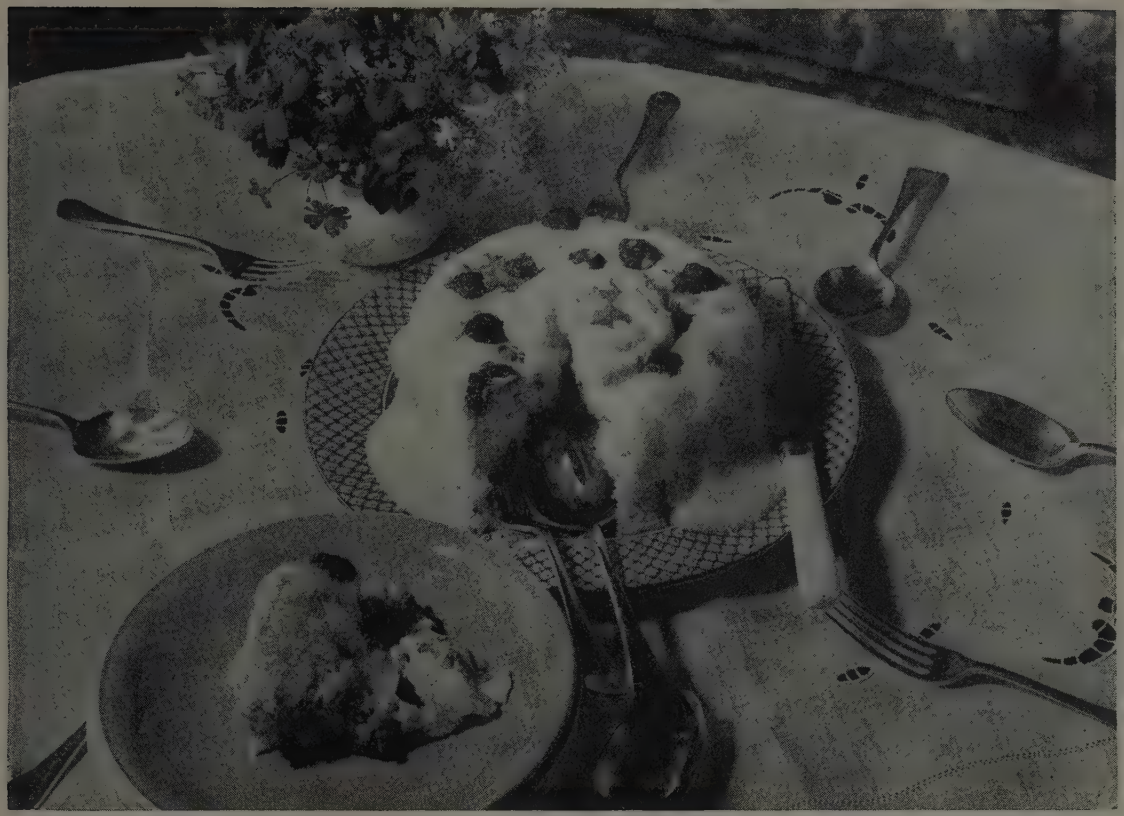

Lemon ice box pudding. The sponge may be made the day before and stored in an airtight tin. Any brightly coloured seasonable fruit may be used as a decoration. Raspberries and whipped cream were used for this pudding.

Flavours for Cream Pie Fillings

1. Coconut: Soak 1 cup of coconut in ½ cup of milk for half an hour. Drain it and add to the mixture. Add the coconut-flavoured milk if the mixture seems too thick.

2. Chocolate: Add 2 oz. of melted chocolate or ½ cup of cocoa cooked with 2 oz. of sugar and ½ cup of water. Increase the cornflour slightly (1 to 2 teaspoons) if extra water is used.

3. Butterscotch. Substitute brown sugar for the 3 oz. of white sugar.

4. Caramel: Melt 4 oz. of sugar and allow it to brown, taking care not to burn it. Warm the milk and add it cautiously to the hot sugar. (It will sputter and the sugar may not dissolve immediately.) Make the filling as directed, but omit the 3 oz. of sugar.

5. Coffee: Add 2 tablespoons of bottled coffee essence or dissolved instant coffee.

Several packaged pudding mixes can be used as fillings for cream pies. Some are best served cold and others hot.

Apple Pie

1 quart of hot, stewed apples
½ cup of clean, washed sultanas
Chopped rind of ½ lemon

Pastry

8 oz. of sifted flour
4 oz. to 6 oz. of butter or a mixture of 3 parts of butter and 1 part of lard
¼ teaspoon of salt
1 teaspoon of lemon juice

Sieve the flour and salt. Cut the fat into small pieces and drop them into the flour. Gradually add the lemon juice and sufficient ice-cold water to make a stiff dough. Chop the mixture with a knife or pastry blender when mixing it—do not use a spoon. Roll out the dough and fold it in half twice. Chill it for a few minutes. Roll out the pastry thinly and place it without stretching it on the dish of apples, sultanas, and lemon rind. Use a pie funnel or egg cup to prevent the crust from sinking into the fruit.

Bake the pie in a hot oven (450 degrees F.) for about 5 to 10 minutes (until the pastry has risen) and then reduce the temperature to 425 degrees F. or put the pie on a lower shelf of the oven for 10 minutes. Serve hot or cold with thick cream or ice cream.

Fruit Sponge

1 quart of stewed or bottled fruit
4 oz. of sugar
2 oz. of butter
1 egg
4 oz. of flour
1 teaspoon of baking powder
Pinch of salt
2 tablespoons of milk

Heat the fruit in an ovenware dish. Cream the sugar and butter and then beat in the egg. Sift the other dry ingredients and add them. Then add the milk gradually, being careful not to overbeat the mixture. Pour it on top of the hot fruit and bake it in a moderate oven (350 degrees F.) for about 20 to 30 minutes, depending on the depth of the sponge.

Steamed Treacle Pudding

1 egg
¾ cup of treacle or golden syrup
1 teaspoon of baking soda
½ cup of water
6 oz. of sifted flour
½ teaspoon of salt
1 cup of raisins
2 tablespoons of melted butter

Beat the egg and add the melted butter and treacle or golden syrup. Dissolve the baking soda in the water

A teenage favourite: "Scorched earth" shortcake.

and stir it into the egg mixture. Next add the sifted flour and salt and beat the mixture thoroughly. Dust the raisins with flour to stop them from sinking to the bottom of the pudding and stir them into the batter. Lastly add the melted butter. Pour the mixture into a greased pudding mould or basin, which must not be more than three-quarters full. Cover the basin tightly and steam the pudding for 1½ hours (considerably less if a pressure cooker is used).

Serve the pudding with a sauce of hot, melted syrup or thin custard.

Apple Crisp

2 lb. of cooking apples
4 oz. of butter
8 oz. of sugar
6 oz. of flour
1 teaspoon of cinnamon

Peel the apples and slice them into a baking dish. Sprinkle them with half of the sugar and moisten with about ½ cup of cold water. Rub the butter into the flour and cinnamon until fine crumbs are formed. Pile this mixture on top of the apples and bake it in a moderate oven (350 degrees F.) for 45 to 60 minutes.

Baked Roly Poly

½ lb. of flour
3 teaspoons of baking powder
½ teaspoon of salt
2 oz. of butter
6 oz. of milk
Jam or sliced raw fruit and sugar or honey to sweeten it

Sift the dry ingredients together, cut in the butter, and add the milk to make a scone dough. Roll out the dough fairly thinly and spread it with jam or sliced raw fruit. Sweeten the fruit with sugar or honey. Roll up the dough and place it in a greased baking dish. (Tuck the rolled side down so that the filling cannot spill out during baking.) Cook in a fairly hot oven (400 degrees F.) for ½ hour or less if the roll is long and thin. To make a brown, crusty top the roll is painted with milk and sprinkled with sugar before it is cooked.

Serve the pudding hot with an appropriate sauce, custard, or cream.

Lemon Sauce

Lemon sauce is usually served with a roly poly filled with pre-soaked sultanas, currants, and grated fresh lemon peel.

2 tablespoons of cornflour
6 oz. of sugar
2 teaspoons of grated lemon peel
4 oz. of lemon juice
2 cups of water
4 oz. of butter
Nutmeg to flavour

Mix the cornflour to a smooth paste with a little of the water. Add the remainder of the water, lemon juice, sugar, and lemon peel. Boil the mixture for 5 minutes. Remove the pan from the heat, add the butter and grated nutmeg to sauce and serve hot.

Scorched Earth

Despite the rather forbidding name bestowed on it during the war, this shortcake was a firm favourite with a family of hungry teenagers.

6 oz. of butter
6 oz. of sugar
10 oz. of flour
2 oz. of cornflour
2 eggs
2 teaspoons of baking powder
Jam to cover the shortcake
2 oz. of sugar

Separate the yolks and whites of the eggs. Pre-heat the oven to 375 degrees F. (moderate heat). Cream the butter and sugar, add the egg yolks one at a time, and gradually mix in the sifted flour, cornflour, and baking powder. Press the dough into a lightly greased baking dish and cook it for 20 to 30 minutes. Beat the egg whites until they are stiff, adding the 2 oz. of sugar gradually. Cover the cooked shortcake with jam or a mixture of minced raisins and apples and pile the meringue mixture on top. Return the shortcakes to an oven heated to 425 degrees F. (fairly hot) and cook it for 5 to 10 minutes. The meringue should be lightly browned and crisp outside and spongy inside.

Lemon Ice Box Pudding

1 fresh sponge cake about 3 in. to 4 in. deep or 2 sponge sandwich layers

Sauce

1 oz. of cornflour
4 oz. of sugar
11 oz. of milk
2 teaspoons of gelatine
2 tablespoons of water
Juice of 2 lemons
½ oz. of butter
2 eggs

Mix the cornflour and the sugar with a little cold milk. Heat the remainder of the milk and when it is boiling stir in the cornflour paste. Simmer the mixture for 5 minutes, stirring continually. Beat the egg yolks while the milk is heating, and when the cornflour mixture is cooked pour it into the beaten yolks. Add the butter. Return the sauce to the pan and cook it over hot water until it is thick. Soak the gelatine in the cold water. Stir the gelatine into the cooked sauce and allow to cool. Fold in the stiffly beaten egg whites and lemon juice. Fill the centre of the sponge with the sauce and before it sets pour the remainder of it over the top. Chill the pudding in the refrigerator. Serve it with whipped cream.

This pudding makes an exciting treat for a birthday tea.

Australian Trees for Flower Garden

APART from acmenas, silky oaks, and a few species of gums and wattles, Australian trees are practically unknown in New Zealand gardens, but the enthusiasm shown for Australian shrubs during the last few years is slowly being followed by an interest in the trees. Once their value is realised and the trees become more generally available they could become a striking feature of the landscape as ornamentals and for shelter and timber. In this article J. S. Say, Horticulturist, Department of Agriculture, Auckland, describes a few of the ornamental species which are suitable for New Zealand gardens. The notes on garden work for August are by Rosalie A. Campion, Horticultural Instructor, Department of Agriculture, Wellington.

THE tremendous variation in soil and climatic conditions in Australia has given rise to a range of trees from which selections may be made for cultivation in many different environments. The two largest groups in Australia—the gums and wattles—are examples of the extreme variations which have been evolved through the centuries.

Species of gums may be found in the coastal and inland swamps, at elevations up to 5,000 ft., or in the arid regions bordering the desert. Some of the tallest trees in the world are gums, but at the other end of the scale, there are many shrubby and low-growing kinds. Wattles show a similar diversity, except in extremes of size.

There is a fairly general idea among growers that all Australian trees and shrubs, especially gums and wattles, need poor, light soils and dry conditions and therefore they are frequently planted in the driest spots in the garden. Though this is true for some which are extremely valuable for planting in light volcanic, rocky, and sandy soils, it cannot be applied generally, as many come from the higher rainfall areas or from swamps and streamsides. A generalisation which is more applicable to Australian trees, apart from those which require definitely wet soils, is that they require perfect drainage. If this is provided, good results can be obtained, with the majority, even on the heavier soil types.

Eucalypts or Gums*

Of the 400 to 500 species of gums known, only 2 or 3 are commonly grown in New Zealand gardens for ornamental purposes, and about 30 are slowly being recognised as extremely valuable timber and shelter trees. Most of the species used for ornamental planting are grown for their flowers, but others have attractive leaves, bark, flower buds, or seed capsules, which should not be overlooked when interesting features are being planned in the garden.

In large gardens or on farms where they can be planted outside the garden proper a number of timber and shelter species can be grown for their architectural value. Their striking shapes and outlines, branching systems, and graceful habits place them among the most picturesque trees in the world.

The aromatic foliage which scents the air for many yards about makes some species worth growing for this reason alone where there is plenty of space. Some gums, mainly the larger shelter and timber species, shed their bark in large sheets and sometimes drop small branches and are unsuitable for planting in areas which have to be mowed. The seed capsules are sometimes a nuisance in home gardens when the trees are planted on or near lawns, but the wonderful display of flowers they give more than compensates for the little extra trouble of raking before mowing.

* Articles dealing with ornamental Australian shrubs for the flower garden and eucalyptus trees for New Zealand farms were published in the April 1958 issue of the "Journal". The latter also includes some ornamental species.

[Elliott

The variegated form of *Agonis flexuosa*.

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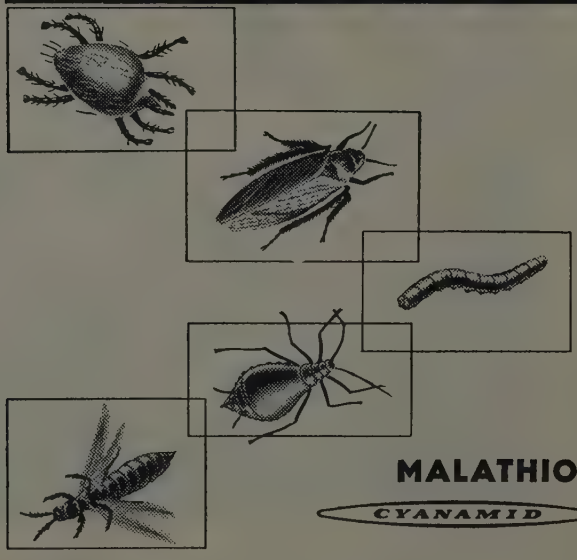

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Some of the less known ornamental species now available in New Zealand are:

Eucalyptus cinerea: Grows to about 20 ft. and makes a good shade tree. It is grown mainly for foliage effect, for the leaves are silvery-grey. It is from the mountains of New South Wales and stands fairly cold conditions. Suitable for seaside planting.

E. erythronema: One of the hardiest gums from Western Australia. About 15 ft., upright habit, and pink flowers. Best in a light soil and will stand dry condiitons.

E. caesia: One of the best of the ornamental gums from Western Australia. It grows to about 15 to 20 ft. with an open, upright habit. The leaves are grey-green and both flowers and fruit are very attractive. The calyx tube is white and the stamens arising from it are pink tipped with gold. Flowers are borne in clusters in winter and spring, and the capsules which follow them are ridged and white and very conspicuous. Does best on a deep, well drained soil. Fairly hardy, but needs protection when young.

E. lehmanni: A spring-flowering gum from Western Australia growing to about 25 to 30 ft. It makes a good shade tree and is suitable for most soils. The stamens ("flowers") are very long and greenish-yellow. Both the buds and the fruit are attractive. Frost tender and needs protection when young.

E. stricklandi: Grows to about 20 ft. with a compact habit. It has thick grey-green leaves and yellow flowers in summer and autumn. It must have a light, well drained soil and will stand very dry conditions. Half hardy and needs protection when young.

Acacias or Wattles

Among the 400-odd species of acacia found in Australia there are many of great ornamental value. They are found in practically all parts of Australia and various species have adapted themselves to many different climates and soils. About 15 species are fairly readily available in New Zealand at present. Some will stand extremely dry conditions, but others require a fertile soil and plenty of water.

Being mainly winter and spring flowering, they can do much to brighten the garden during an otherwise dull period. Also, the silvery-grey foliage of some species can be used most effectively. Their rapid growth makes them very useful as temporary fillers between slower growing trees and where quick and attractive shelter is needed. Hard pruning after flowering is advisable for most species and all should be securely staked until well established. *Acacia baileyana*, *A. pravissima*, and *A. podalyriaefolia* are deservedly popular, for they are among the best of the small trees for home garden planting. Other recommended though less well known species are:

Acacia cardiophylla: A wattle from inland New South Wales. Grows to about 12 ft. and is usually wider than it is high. It produces masses of golden flowers in spring. Good for most soils and stands dry conditions well. Will stand moderate frosts.

A. longifolia: Usually flowers a little later than the well known *A. baileyana* and does not grow quite so large. Good for a quick shelter and excellent for sandy soils on the coast. It has pale golden-yellow rod-shaped flowers in spring which last well when cut. Half hardy.

A. pycnantha: Large heads of globular golden flowers in spring and large leaves. Grows very fast. Does well on almost any soil. Will stand dry conditions exceptionally well and coastal conditions. Height about 15 ft. Half hardy.

[*Elliott*

▲ *Eucalyptus ficifolia*, one of the most popular of the ornamental gums, bears masses of scarlet flowers.

A. subporosa (river wattle): bears yellow flowers in spring and grows to 20 to 40 ft. Suitable for all positions. In the open it is bushy, but in sheltered or semi-shady situations grows upright and has a very graceful habit. The leaves are long and thin. Suitable for river banks or any moist (but not stagnant) soil, but will grow well in most places.

Other Useful Trees

Other useful Australian trees are:

Agonis flexuosa (Australian willow myrtle): A quick growing small tree about 20 to 25 ft. high. It will stand very dry conditions once established. It is most suitable for light soils and coastal planting. Growth habit resembles that of a weeping willow. The

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▲ *Banksia integrifolia* is an excellent small tree for coastal planting in sandy soils. It stands wind well and could be used as a windbreak. The flowers are yellowish and borne in autumn. Elliott photo.

A casuarina growing on the beach at Timaru. →

young growths are pink. A variegated form is also available. Bears masses of small white flowers in spring.

Anopteris glandulosus (Tasmanian laurel): A small tree growing 15 to 20 ft., it likes a cool, moist fairly heavy soil and will stand coastal conditions. Large, handsome leaves and clusters of small white flowers in spring.

Brachychiton acerifolia (*Sterculia acerifolia*), Illawarra flame tree: Bears masses of bright flame-coloured, waxy, bell-shaped flowers about 1 in. long for 6 to 8 weeks from about mid-December. The flower stems are also highly coloured and add to the brilliance of the tree. It is semi-deciduous and has few, if any, leaves at flowering time, so that the tree appears as a sheet of flame, making it one of the most brilliant trees seen in New Zealand gardens. Flowering usually begins when the tree is about 15 years old and is sometimes erratic afterward, but it is well worth waiting for. Forming a symmetrical tree 30 to 40 ft. high, it makes an excellent specimen with attractive foliage for the warmer parts of the country. It needs a sheltered position and a fairly heavy soil, but will stand dry conditions when established.

Brassaia actinophylla (umbrella tree): From Queensland, it has large, leathery, compound leaves. It makes an excellent pot or tub plant for indoor decoration and can be grown fairly easily outside in warmer districts, reaching a height of 30 to 40 ft., but is not particularly attractive with age. It does not flower freely enough in New Zealand to make its red flowers a feature. Best in a well drained soil and will stand dry conditions.

Callitris cupressiformis (dune cypress): A conifer growing about 15 to 18 ft. high, from the coast of Queensland and New South Wales, it has a dense, compact habit with fine dark green foliage. The new growths are long and lacy and rather pendulous. It thrives in a sandy loam, but will do well in most soils. Excellent for specimen planting or as a pot plant. Hardy, but browns in winter, giving it an attractive appearance and is good for seaside planting.

C. oblonga (Tasmanian dwarf cypress): Growing to 8 or 10 ft., it has blue-grey foliage with a dense upright habit of growth. Suitable for most soils, it stands wind and is good for seaside planting.

C. robusta (white cypress): From inland Queensland and New South Wales, it grows about 20 to 30 ft. It has light green foliage and an upright habit. It prefers a light soil, but will grow in most positions and stands wind well.

All are good for hedges.

Casuarina cunninghamiana (river she-oak): A quick growing, large, dome-shaped tree with a dense and somewhat pendulous habit. It is hardy and suitable for most positions where there is room. It prefers a moist soil, but will grow almost anywhere. Good for seaside plantings.

C. glauca (swamp she-oak): Of upright habit; it grows to about 40 ft. Dark green foliage. A good coastal plant and does well in poorly drained positions.

C. torulosa: A small tree growing to about 20 ft. with very fine drooping branchlets. It turns reddish-bronze in summer and in winter and makes

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[*R. F. Jordan*

▲ *Stenocarpus sinuatus*, the Queensland firewheel tree, flowers in late autumn-early winter.

[*R. F. Jordan*

▲ *Eucalyptus lehmanni*. The curiously shaped flower buds in the foreground are greenish-yellow with a bronze tinge.

a good specimen tree. It is not particular about soil so long as it is deep and well drained. Half hardy.

Eugenia smithi (*Acmena floribunda*), monkey apple: One of the most handsome evergreen trees for specimen planting in warmer districts, but unfortunately is usually regarded as a hedge plant and is rarely allowed to assume its full stature. As a hedge or trimmed shrub it suffers badly from thrips on the leaves and fungous troubles at the roots, but when allowed to grow naturally is seldom attacked. It forms a symmetrical tree more or less oval in outline and up to 30 to 40 ft. high. In winter it often makes a wonderful show with masses of white or mauve berries. It also makes a very attractive high, untrimmed shelter belt. Prefers a deep, well drained soil, and is good for coastal planting.

E. myrtifolia (Australian rose apple): An excellent tree for seaside planting. Resembles *E. smithi*, but does not grow so large and the leaves are smaller, shining and bronze when young. The flowers are small and white and are fairly conspicuous. They are followed by rosy purple berries.

Ficus macrophylla (Moreton Bay fig): Forms a large, spreading tree up to 40 or 50 ft. high with large, dark green leaves. Because of its size and its vigorous root system which will disrupt paths, etc., for many yards round, it is suitable only for public parks or farms where there is unlimited room, but it makes a first-class pot or tub plant. When used in this way it is sometimes incorrectly known as the "rubber plant". Frost tender.

Grevillea robusta (silky oak): From New South Wales and Queensland, it forms a large tree of symmetrical habit up to 40 to 50 ft. when fully grown. It is semi-deciduous, shedding most of its leaves in late spring. Many people do not like it for this reason, as they regard it as an untidy tree, but it is excellent for specimen or shade planting and is suitable for coastal conditions. The leaves are deeply cut, and a good dark green with a light reverse which gives the tree a lively appearance when the leaves move in the wind. Old trees bear spikes of orange flowers freely in early summer. Does well in most soils and stands dry conditions well. Half hardy, but needs protection from frost when young. It makes a good pot plant for room and glasshouse decoration.

Hymenosporum flavum (Australian frangipani): A small upright tree from the coastal regions of New South Wales and Queensland with fragrant yellow or cream flowers. Grows fairly rapidly and likes a moist soil. Frost tender and even in warmer districts needs protection when young.

Lagunaria pattersoni: Though this tree is popularly known as Norfolk Island hibiscus, it is also a native of the coastal zone of Queensland. It is a quick growing, dense tree up to 30 ft. high. The leaves are a dark green with a whitish reverse, giving the tree a pleasing greyish appearance. The flowers in summer are in various shades of pink or pinkish mauve and do not show up from a distance, but are attractive when seen from close by. It will stand wind in exposed positions, poor soil, dry conditions, and is exceptionally good for coastal conditions. Half hardy.

Macadamia (Queensland nut): A dense, compact, symmetrical tree growing to about 25 ft. in New Zealand. It has stiff sometimes deeply serrated leaves which resemble those of rewarewa. When grown from seed its shape varies from upright to somewhat spreading. It does well on any well drained soil, but is frost tender, especially when young. The brownish flowers, borne in drooping racemes, are followed by clusters of nuts. The kernel is rich in flavour, creamy white, and keeps well, but has an extremely hard shell which is difficult to crack with an ordinary nut cracker. It bears in 7 to 10 years from seed. The plants generally grown in New Zealand are *M. tetraphylla* and *M. integrifolia* seedlings. Both are usually incorrectly called *M. ternifolia*. Named varieties have been introduced, but are not available yet.

Melia azedarach (Australian white cedar): A deciduous tree very suitable for specimen planting or for shade. Grows to 20 to 30 ft. and has a fairly spreading canopy when mature. The leaves are pinnate and light green, the flowers in panicles in late spring are pale mauve, and the berries are yellow and often remain on the tree after the leaves have fallen. It does not seem

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MADE IN NEW ZEALAND

to be particular about soils and will stand fairly wet conditions.

Myoporum serratum (Tasmanian ngaio): A quick growing, small evergreen tree growing to about 10 ft. with dense, compact growth to the ground, but can be trained as a shade tree on a single stem. Excellent for seaside shelter and will grow well in almost pure sand.

Scolopia browni: An evergreen tree with large, shining leaves and panicles of small white flowers. Does best in a well sheltered position on a deep, moist soil.

Stenocarpus sinuatus (firewheel tree): From Queensland, it produces clusters of bright red flowers on the tips of the branches in late autumn. Each head in the cluster consists of about a dozen narrow flowers arranged like the spokes of a wheel. The foliage is a good glossy green. It is frost tender, but will do well in the warmer parts of the country, though rather slow growing. It needs a deep fertile soil in a sheltered position. Grows to about 30 ft.

Syncarpia laurifolia: A tall tree growing to 60 ft. or more. From coastal Queensland, it has dark green foliage and white flowers in spring and makes a good specimen or shade tree where there is room, and is more suitable to heavy types of soil. Requires very warm conditions and a moist but well drained soil.

Tristanea conferta (*Lophostemon conferta*): A large, spreading tree, growing to about 50 ft., from the coastal jungles of Queensland. It makes a good specimen or shade tree, but is suitable only for large gardens. The foliage is dark green and glossy and very attractive, the flowers are white but often hidden by the foliage, and the bark under some conditions is pinkish and mottled. It will stand fairly dry conditions.

Viminaria denudata: A quick growing small tree growing about 10 to 12 ft. with a graceful habit. The yellow pea-shaped flowers are borne in racemes at the ends of pendulous, wiry stems in December. The tree grows naturally in swampy positions, will do well under average garden conditions, but prefers a light, moderately rich soil.

Incinerator and Compost Bin Unit

SEVERAL readers have asked for details of construction of the incinerator and compost bin unit shown above and which was illustrated on page 415 of the April issue.

The unit is made of second-hand 4½ in. bricks and the internal dimensions are: incinerator 28 in. x 18in. x 3 ft. 6 in. high; each bin 32 in. x 27 in. x 2 ft. 9 in. high.

The firebars were made from ⅝ in. diameter reinforcing bars spaced 2½ in. apart and were welded on top of a 26 in. x 16 in. rectangular frame on 4 legs. The frame and legs were welded from 1¼ in. x 3/16 in. steel strap so that the whole grating on legs is 11 in. high. It rests loosely on the floor to allow it to be pulled out through the fire opening at the base of the incinerator front. This makes for easy hoeing out of the ashes and easy replacement of any burnt-out firebars.

No special provision has been made for draught because the natural draught is ample.

The floor of the incinerator is plastered with a slight fall outward. The compost bins have only an earthen floor, and some of the lower vertical brick joints are open to assist drainage.

All the tops are open, but the incinerator has a 12-gauge steel lid to keep the contents dry and this is removed before firing. The lid is slightly bigger than the overall size of the brickwork top.

The fire is generally started by old newspapers, pushed in under the firebars and lit.

The front of each compost bin is formed of separate boards which drop into place within metal clips built into the brick joints.

Garden Work for August

The early-flowering bulbs indicate that the busy spring season is approaching. Preparation and maintenance should be brought up to date. Seeds should be purchased so that as the ground warms there is no delay in sowing.

Seed Sowing

Toward the end of August the ground should be warm enough, especially in northern districts, for sowing the seed of hardy annuals in sheltered positions in open ground. In colder districts it is still too early except where some protection such as frames or cloches is available. Under cloches the ground should be prepared in advance and covered with glass to warm the soil for at least 2 weeks before sowing. Seed of antirrhinum, clarkia, calendula, phlox, cornflower, larkspur, godetia, nigella, and candytuft can be sown.

In a glasshouse or frame the range can be extended to include nemesias and pansies for early-summer flowering and glasshouse plants such as streptocarpus, gloxinias, and *Primula obconica*.

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IA—8

Propagation of Chrysanthemums

Cuttings can be taken from the regrowths produced by chrysanthemum stools. Stools which are slow in producing growth suitable for cuttings can be lifted and planted in sand or sawdust in a frame to induce growth.

Many people take "Irishman's cuttings", which have a rooted heel. Plants which grow more sturdily, are freer from pests such as eelworm and gall midge, and which are not so likely to be troubled by fungous diseases can be obtained by taking a cutting from above ground level. The cuttings should be 2 to 3 in. long and cut off cleanly just below the lowest leaf. The two bottom leaves should be removed before the cuttings are dibbled in 2 in. apart and not more than 1 in. deep in a sandy mixture or in pure sand. Cuttings in boxes should be placed in frames and after watering should be covered with a sheet of paper or plastic film for a day or two to prevent the cuttings from flagging. These cuttings should be well rooted within a month.

Clematis

Well grown plants, preferably 2 years old, of the flowering climber clematis can still be purchased for planting. Difficulty is often experienced in establishing this plant, and one of the important requirements for success is a cool and shaded root run which is well drained. The plant should be set out firmly in soil which has been enriched with compost or other organic matter, lime, and bone meal. Deep planting, so that the crown is 3 to 4 in. deep, encourages stem and scion rooting on grafted plants and will give added vigour.

By planting of a range of varieties clematis can be in flower from November until April. One of the earliest is *Clematis montana rubra*, a pretty, small-flowered pink. Mid-season varieties are Ville de Lyons (carmine red), Nellie Moser (pink barred with carmine), *C. jackmani* (rich violet purple), and Madame Edouard Andre (bright velvety red). *C. tangutica* flowers late and retains its feathery seed vessels throughout winter.

Established plants of Gipsy Queen, Ville de Lyons, and the *C. jackmani* varieties can be pruned back now to a joint about 18 in. from the ground. Where growths normally spring from below soil level they can be pruned to soil level.

Terms Used to Describe Spray Materials

SEMI - TECHNICAL terms which are often used to describe constituents of sprays are as follows:

Spreading and wetting agents are materials which help spread the spray droplets over the leaf surface and increase the rate at which the spray soaks into or wets a surface. These are used particularly when spraying plants which have a waxy or hairy surface. Soft soap is widely used with sprays of nicotine sulphate and pyrethrum for this purpose. There are many proprietary brands of other materials available.

Adhesives or sticking agents are used to help stick the spray materials on to the foliage and reduce the amount removed by wind and rain. Summer oil is sometimes used for this purpose, but should never be used with sprays containing sulphur. Casein is a useful adhesive.

Hydrated lime is used in arsenical sprays and in making bordeaux mixture as a **"safener"** to reduce spray damage to the foliage.

Manuka Blight

In recent years a scale insect has caused the death of large areas of wild manuka. Unfortunately these insects also attack the ornamental manukas and can rapidly cause death unless controlled. The insects secrete over the bushes a sticky substance ("honey dew") on which a black sooty mould quickly develops. This is when the presence of the scales is usually

[*Sparrow*

Where a sheltered position is available seed sowing can be started outdoors in northern districts this month.

detected. If these insects are found on manuka, a combination spray of

1 teaspoon of 50 per cent DDT wettable powder

1 teaspoon of 40 per cent nicotine sulphate

1 teaspoon of a wetting agent

1 gallon of water

or a spray of malathion emulsion repeated twice at 10-day intervals should be applied.

Removal of Lichens

The appearance of lichens on the limbs of deciduous azaleas, crabapples, and other deciduous ornamental plants is common in damp and shaded positions. They are generally thought to be unsightly and can be removed by spraying while the trees are still dormant. A spray of bordeaux mixture or copper-oxychloride with the addition of a wetting agent will satisfactorily kill the lichens.

Tree Stumps

One of the best methods of killing old tree stumps which have persistent regrowths is by frilling or chipping round the trunk sufficiently deep to lift the bark. A proprietary mixture of 2,4-D and 2,4,5-T which could be diluted in 10 times its volume of diesel fuel can be painted lavishly round the frill. When there is no further trace of the diesel fuel the stump can safely be planted over or covered with creepers. If it is desired to destroy the stump, auger holes 8 in. apart and 6 in. deep can be made in the stump. Sodium chlorate or nitrate of soda can be placed in these holes and left for 2 to 3 months, by which time the materials should have penetrated the stump. The stump can then be saturated with kerosene and burnt.

Roses

The pruning of roses should finish in August in all districts. All dead and diseased wood should be removed and burnt, and except where there is insufficient replacement wood, spindly and crossing growths can be cut out. Matured wood can be pruned to an outside bud about half-way down this season's growth. Where there is much growth the wood can be thinned by removing, as low as possible, old stems which have flowered. The standard bushes should be pruned more severely in a cup-shaped form. While the plants are still dormant the sprays suggested last month should be applied. As growth begins sprays of thiram, ferbam or copper should be applied to combat black spot fungus.

Planting and Pruning Shrubs

The planting of deciduous plants should be concluded without delay, but the planting of evergreen and potted plants can be continued. Trees planted earlier will benefit from being

Upper—A standard rose bush as received from the nursery. Lower—A new standard rose which has been pruned after planting.

tramped round to consolidate the soil after frosts and rains. Large stones placed round the base will give anchorage and have a mulching effect during summer.

Early-flowering shrubs can be pruned after flowering and most hedges can be trimmed. Where large limbs are to be removed from trees the initial cut should be on the underside of the limb about 6 in. beyond the final cut. Cut to the centre of the limb or until the saw jams. The second cut can then be made on the top of the branch close to the first cut. The stub can be recut flush with the main branch and painted with petroleum jelly.

Laying Down Lawns

Lawn preparations should be completed so that sowing can be started as the ground warms toward the end of the month. Low areas should be filled in and mounds levelled off. Lawns sown in autumn can be rolled to consolidate after winter frosts. On these new lawns the mower used should be sharp and set fairly high. All clippings should be removed.

In the Glasshouse

Before the main seed sowing begins is a suitable time for emptying the glasshouse and giving it an annual clean up. All the benches, walls, pipes, and concrete floors should be scrubbed down and thoroughly wetted with a solution of 1 pint of formalin in 6 gallons of water. The application of formalin by pressure pump or watering can should be started at the far end of the house and the operator should work toward the door to reduce the discomfort from fumes. The door should then be locked for 24 hours. The house can be opened up and when all trace of the fumes has disappeared planting can be started. In this way many pests and diseases can be eliminated.

In the north and where heat is available tuberous begonias and gloxinias can be started into growth.

Hydrangeas in pots for early-summer flowering can be taken inside and given side-dressings when growth has started.

General

The autumn mulch can be dug into the mixed border and a general fertiliser can be applied at 2 oz. per sq. yd. Bearded iris can be given a dressing of superphosphate at 4 oz. per sq. yd.

Cuttings 4 in. long of slower growing plants such as delphinium, geraniums, irisene, heliotrope, phlox, and balsams can be placed in boxes of sand and put in a cold frame to root.

Many rock plants can be put in as the rains ease, and construction of new rockeries and features can be continued. Winter rains may have exposed faults in previous rock constructions which can now be rectified.

If a large number of a specific variety of dahlias is required, the old tubers can be boxed up in sawdust in a frame to induce shooting from which cuttings can be taken in September.

A start can be made on the planting of sprekelia, gladiolus, nerine, and tigridia. The bulbs should be soaked in a mercuric dip for 30 to 50 minutes before planting. Tulips should be sprayed with lindane to combat aphids and with thiram to prevent attack by botrytis fungus. A watch should be kept for the formation of black rust spores on iris foliage.

Sweet peas can be sown where the soil is warm enough. A pinch of thiram, copper-oxychloride, or ferbam well shaken in the packet will help resist fungal attack. Metaldehyde baits for slugs placed above the seedbed are a wise precaution.

Layering of shrubs can be attempted now. The planting of shelter should be continued. A quickly growing temporary shelter plant is tree lucerne.

Old pot plants can now be reconditioned. With some it may be necessary only to remove a little soil from the top of the plant and replace it with fresh, enriched soil, but with others it may be necessary to repot them.

Classic Cardigan with Gingham Front Facings

THAT the simple lines and stitch of the ordinary, classic cardigan can be considerably enhanced is illustrated by the attractive garment with the gingham front facings shown here. Instructions for making the cardigan are given below.

ABBREVIATIONS: St.st., stocking stitch; k., knit; p., purl; rem., remain(ing); cont., continue; dec., decrease; inc., increase; st., stitch; tog., together; foll., following.

Materials: 10oz. of 4-ply knitting wool; 2 No. 10, 2 No. 11, and 2 No. 12 knitting needles; ¾yd. of check gingham (or two crossway pieces, 5½in. wide and 24in. long); 4 buttons.

Measurements: To fit a 34in. bust: Length from shoulder 21in.; sleeve seam 17½in.

Tension: 7 st. to 1in. on No. 10 needles.

The Pockets (Two Alike)

Using No. 11 needles cast on 35 st. and work in st.st. for 4in., ending with a p. row. Leave st. on spare needles.

The Back

Using No. 12 needles cast on 126 st. and work in st.st. for 1in., change to No. 11 needles and cont. in st.st. until work measures 6in. from cast-on edge. Change to No. 10 needles and cont. until work measures 13in. from cast-on edge.

Shaping the Armholes

Cast off 4 st. at beg. of next 2 rows, then 2 st. at beg. of next 4 rows, then dec. 1 st. at each end of every alternate row until 98 st. rem. Cont. straight until work measures 22in. from cast-on edge.

Shaping the Shoulders

Cast off 10 st. at the beg. of next 2 rows, 11 st. at beg. of next 2 rows, and 10 st. at beg. of next 2 rows. Cast off rem. 36 st. for back neck.

The Right Front

Using No. 12 needles cast on 58 st. and work in st.st. for 1in. Change to No. 11 needles and cont. in st.st. until work measures 6in. from cast-on edge, ending with a row on the wrong side.

Insert pocket: K. 11 st., slip next 35 st. on to a piece of wool, knit across 1 set of pocket st., then knit rem. 12 st. Change to No. 10 needles and cont. until work measures 13in. from cast-on edge, ending with a row on the right side.

Shaping the Armholes

Next row: Cast off 4 st., p. to end.

Next row: K.

Next row: Cast off 2 st., p. to end.

Next row: K. Repeat last 2 rows once more. Now dec. 1 st. at beg. of every p. row until 44 st. rem., ending with a p. row.

Shaping the Front

Dec. 1 st. at beg. of next and every foll. sixth row until 33 st. rem. Cont. straight until front measures 22in., ending with a row on the right side.

Next row: Cast off 11 st., p. to end.

Next row: K.

Repeat last 2 rows once more. Cast off rem. st.

The Left Front

Work as for right front until pocket is reached, ending with a row on wrong side.

Insert pocket: K. 12 st., slip next 35 st. on to a piece of wool. K. across rem. pocket st., then k. rem. 11 st. Change to No. 10 needles and work as for right front, reversing all shapings.

The Sleeves

Using No. 12 needles cast on 64 st. and work in st.st. for 1in. Change to No. 11 needles and cont. in st.st. until sleeve measures 4in. from cast-on edge. Change to No. 10 needles and inc. 1 st. at both ends of the next and every foll. eighth row until there are 94 st. Cont. straight until sleeve measures 18½in. from cast-on edge, ending with a row on the wrong side. Then dec. 1 st. at both ends of next and every alternate row until 80 st. rem. Then dec. 1 st. both ends of every row until 22 st. rem. Cast off.

Return to st. left on wool for pocket tops, and using No. 11 needles work in st.st. for 1in. Cast off.

To Make up

Press all work with a warm iron over a damp cloth. Sew down pocket linings. Turn in pocket top and slip stitch to inside of pocket. Join shoulder, side, and sleeve seams, sew in sleeves. Stitch 1in. hem all round bottom of cardigan. Stitch 1in. hem at bottom of sleeves. Cut the gingham to make a 27in. square, then fold corner to corner and press the fold as a guide to the accurate bias line. Now cut the two crossway strips, and join into one long strip. Tack the strip all round the front and neck edges of the cardigan on the right side, stretching the gingham slightly to ensure a neat fit. Stitch neatly, then turn over to the edge on the wrong side and hem down. Neaten the ends and press the facing thoroughly. Either fasten with 4 press studs, stitching buttons on over the press studs, or, if preferred, cut 4 buttonholes and work round them in buttonhole stitch.

A Baby's Simply Made Dressing-gown

By ELEANOR S. CAMPBELL,
Home Science Instructor, Department of Agriculture, Auckland

[*Sparrow*

THE little dressing-gown illustrated at right is quickly and easily made; no pattern is needed. It is neat and warm to wrap round baby and is easily washed.

THE materials required are 1½ yds. of flannel (the more loosely woven quality of flannel is better, as it does not felt as much when washed); 3 yds. of 1 in.-wide nylon ribbon; 1 reel of embroidery cotton or silk.

Draughting and Cutting

The material is opened out flat and then folded over in half, so that the selvedges are at the sides and the fold is along the top as shown in diagram A.

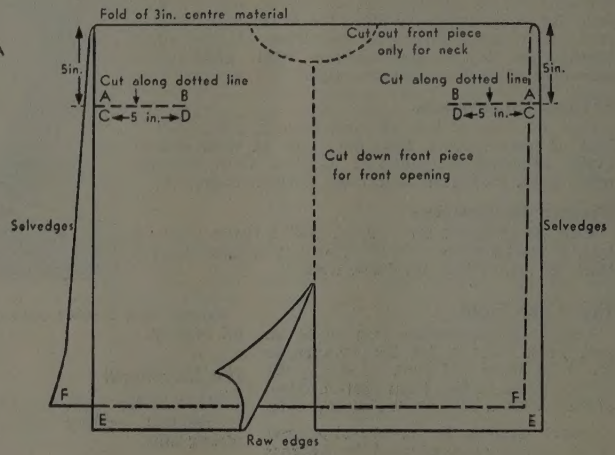
On each side of the material measure 5 in. down from the top and make a straight cut 5 in. long in toward the centre.

Measure the centre line down the front of the material and cut along the line on the front piece of the material only. (See dotted line in diagram A.)

Make the neck of the garment by cutting a semicircular piece out, about 6 in. to 7 in. in diameter, at the top of the centre front.

DIAGRAM A

CUTTING



Sewing

On each side machine stitch the selvedges EC and FC together to form the side seams (see diagram B). Press seams flat.

Machine stitch along the top edges of the two 5 in. cuts AB AB, as shown in diagram B, to form the sleeve seams. Press seams flat.

Gather the raw edge left under the sleeve seam and stitch the gathers neatly at point D, under the arm. Bind with nylon ribbon if desired.

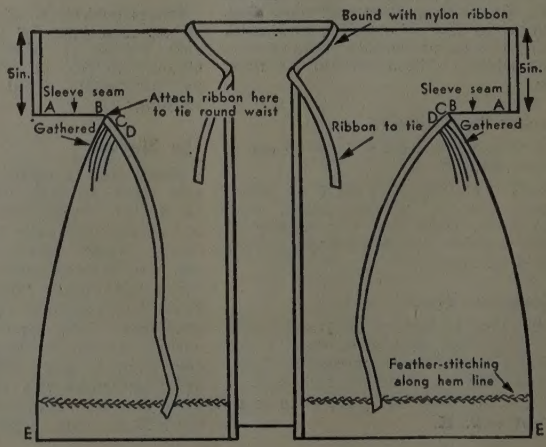
Bind the neck edges and the front openings with nylon ribbon. Turn up the hem to the desired length and hem.

A decorative touch can be added by feather-stitching with embroidery cotton along the line of the hem.

Sew the ribbon at the neck edges for a tie and also sew two more pieces of ribbon on the outside of the garment under the arm at point B. These should be long enough to cross over at the front and tie at the back or, if preferred, they can be made still longer and brought round to the front again to tie.

DIAGRAM B

SEWING



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